THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXV. No. 623.] LONDON, APRIL 20, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 28-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1838. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
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GENUINE TORBAY PAINT
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SPECIAL GASOMETER PAINT
(Mixed ready for use).
FOUR PRIZE MEDALS.
WORKS: BRIXHAM, TORBAY.
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
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SPECIALITIES IN WOOD GRIDS
FOR
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OF
WELL-SEASONED PLANKS.
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COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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Coal Office,
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JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
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Established at the commencement of Gas Lighting.
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
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RETORT-SETTING A SPECIALITÉ.
RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America.
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For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
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IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
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G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

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LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

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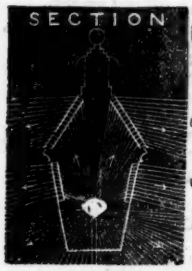
AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



THE PATENT
CATOPTRIC LAMP
Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
T. A. SKELTON, 37, Essex St., Strand, London, INVENTOR AND PATENTEE.

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PHŒNIX FIRE-BRICK WHARF,

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GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over thirteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced or resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

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WAREHOUSE: SOUTHWARK STREET, LONDON.

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PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

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TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

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MANUFACTURERS OF

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CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully,

MAGNUS OHREN.

Size, 26½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

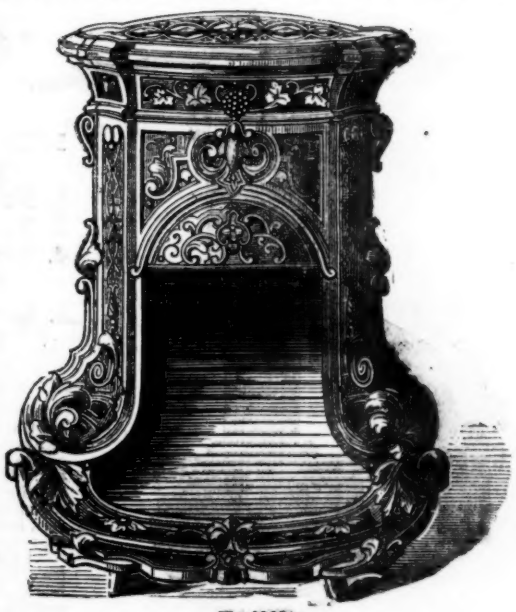
BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.



No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector,

Has all the appearance of a Bright Fire.

PRICE from 32s.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

J. T. B. PORTER AND CO.,

ENGINEERS AND CONTRACTORS,

LINCOLN, AND 1, WESTMINSTER CHAMBERS, LONDON, S.W.,

Beg respectfully to remind Gas Companies and Corporations that they continue to manufacture and supply every description of Apparatus connected with the

MANUFACTURE OF GAS AND ITS DISTRIBUTION.

GASHOLDERS, PURIFIERS, SCRUBBERS, CONDENSERS, RETORTS, &c., &c.

PLANS, SPECIFICATIONS, AND ESTIMATES FOR WORKS OF ANY SIZE.

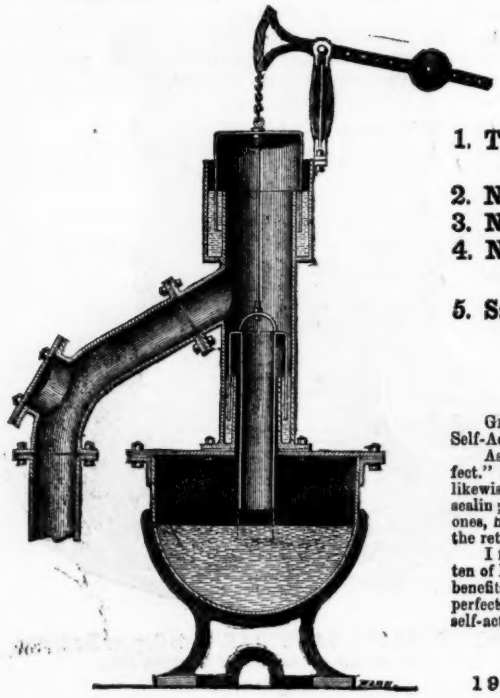
REFERENCES TO MORE THAN 500 WORKS ALREADY ERECTED.

PROSPECTUSES AND TESTIMONIALS ON APPLICATION.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

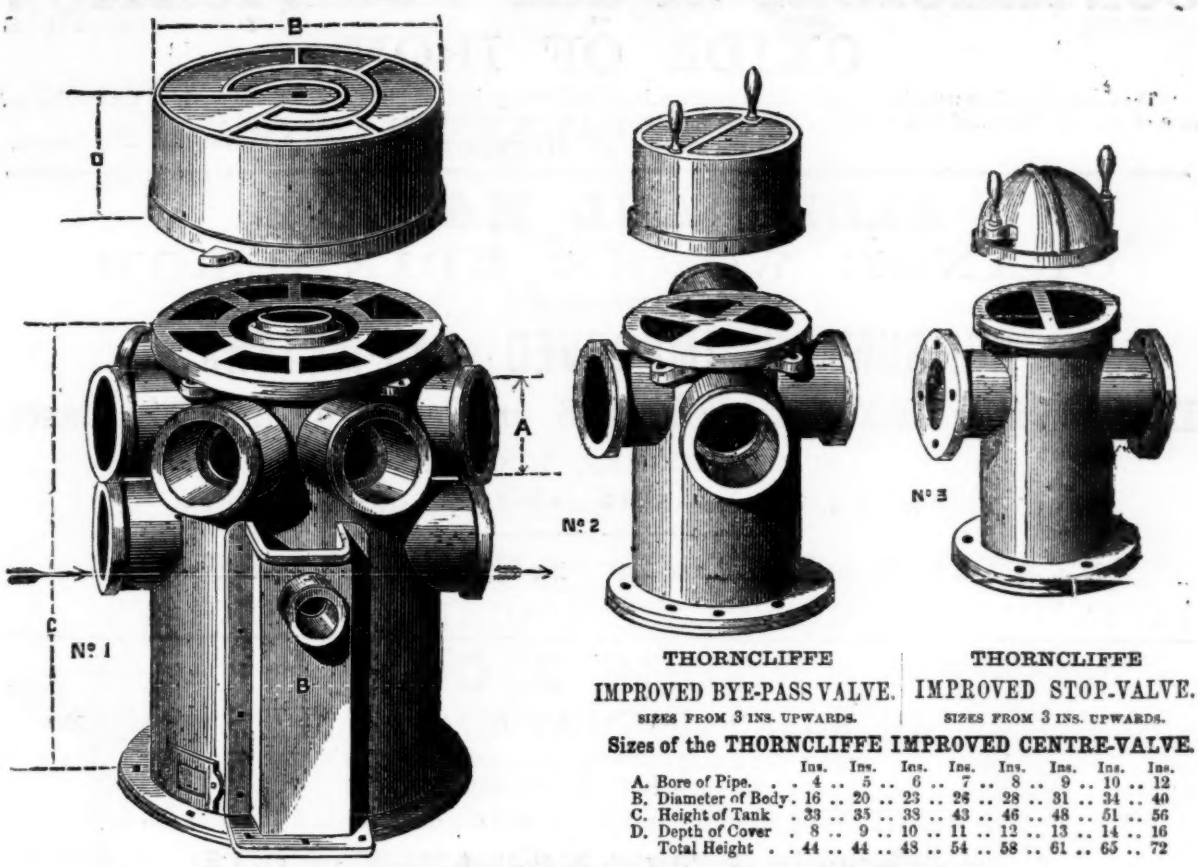
For terms of use and cost, apply to Mr. G. W. STEVENSON,

19, GREAT GEORGE STREET, WESTMINSTER.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.



THORNCLIFFE IMPROVED BYE-PASS VALVE. SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

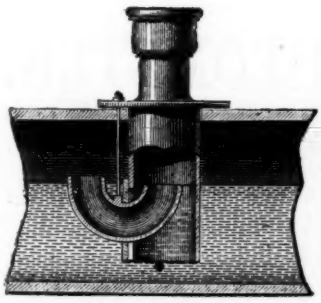
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

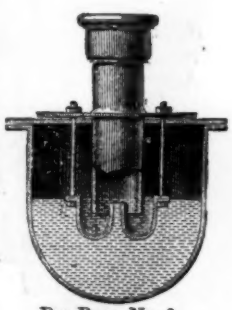
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. NEWTON, CHAMBERS, & CO., Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast Iron and Tin Cases,

OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

PRIZE MEDALS—1862, 1867, 1871, 1874.

SYDNEY LEONI & CO.,

Sole Licensees and Agents for the United Kingdom of Great Britain for

GIROUD'S PATENT RHEOMETER.

This Instrument is easily fixed under any Burner; it regulates the volume of the Gas to be consumed, notwithstanding the Size of the Burner or the Variation of Pressure.

Full particulars on application, also PAMPHLETS on the "Advantages of Heating and Cooking by Gas," with Illustrations, &c., of the latest and most improved

"CHEERFULS,"

And other new Patent Heating Stoves under China and Terra Cotta Covers.

LIBERAL TERMS TO THE TRADE.

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TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

HOLMAN'S PATENT ECCENTRIC FASTENINGS,

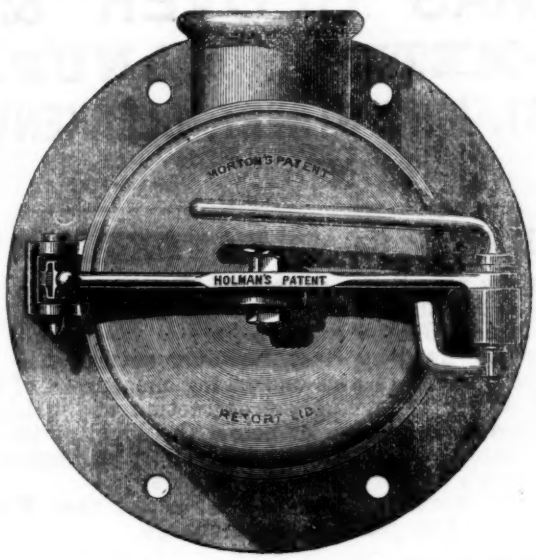
ANTI-FRICTION CATCHES, AND NEW SELF-SUSTAINING CROSS-BARS.

NO LUTING.

NO DUPLICATE LIDS REQUIRED.

INSTANTANEOUS SEALING EFFECTED.

VERY DURABLE.



HOLMAN'S NEW SELF-SUSTAINING CROSS-BAR ENSURES FREEDOM OF JOINT, AND MAINTAINS PARALLEL POSITION OF THE LIDS.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 15,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where, by the end of 1875, nearly 4000 will be in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Barnet.

The Gas-Works, Royal Arsenal, [Woolwich.
" do. Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.

The Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.
" Bournemouth do.
" Ystrad do.
" Cardiff do.
" Rochester do.

The Keighley Gas-Works.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

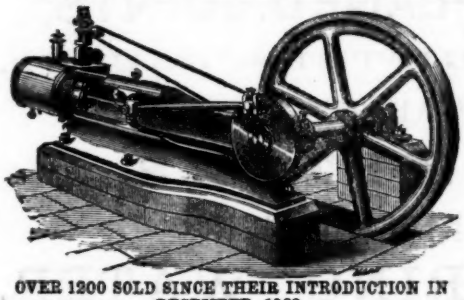
Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,
(Signed) G. C. TREWBY.

TANGYE'S HORIZONTAL HIGH-PRESSURE EXPANSIVE

STEAM-ENGINES.



OVER 1200 SOLD SINCE THEIR INTRODUCTION IN DECEMBER, 1869.

In designing this Engine the utmost regard has been paid to simplicity of arrangement, strength of construction, and economy in cost. The working parts are considerably reduced in number, as compared with Horizontal Engines generally, rendering it far more durable and compact, the bed-plate, front cylinder cover, guides, and plummer-block for crank-shaft bearing being all cast in one piece, which in design and proportions is admitted by competent engineers to be perfect, and to afford a strength and rigidity that cannot possibly be attained in the best fitted engines of the ordinary horizontal type. The extraordinary stiffness of this Engine will permit of its being driven at a much greater maximum speed than engines generally, and with far less wear and tear. The cylinder with its valve-chest is bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly-wheel, cylinder-end, connecting-rod, and crank-plate, are all bright. All the parts are made to Whitworth's Gauges, and the material and workmanship are of the highest class throughout.

The Governor is of a very special description, and combines in the small space usually occupied by the ordinary steam stop-valve, a governor, throttle-valve, and stop-valve complete. It is exceedingly sensitive, simple, and compact.

These Engines are adopted in Gas-Works at Haggerston (Independent Gas Company), Nine Elms (London Gas Company), Falmouth, Harrow, Jersey, Plymouth, Richmond, Rochdale, Santiago (Chili), &c.

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 20, 1875.

Circular to Gas Companies.

The repeated postponement of the second reading of the Metropolis Gas (Regulations) Bill augurs badly for the ultimate success of that measure. It is now on the paper of the House of Commons for Tuesday, the 4th of May; and, supposing the second reading to be carried on that day, we do not think the prospects of the Bill would be much improved. The committee would not be appointed for some days, and they could not commence their sittings until after Whitsuntide. We think it probable that the proceedings before the committee will last, at least, a month. The inquiry to be entered upon is wider than any that has yet occupied a committee on a gas Bill. The circumstances of each individual metropolitan company will have to be investigated, for no two exist under precisely similar conditions. The "Regulations" which would not affect one company for years to come, would be fraught with the grossest immediate injustice to others. Then the opposition must necessarily take up a good many days, and we are led to the conclusion that if the committee report by Midsummer Day, unwonted diligence will have been exercised. We will, however, suppose—for when we conjecture we may as well suppose the worst—the Bill to have passed the House of Commons, and to be sent up to the Lords within the period fixed by the Standing Orders of the Upper House for the reception of new measures. All the proceedings before the committee of the Lower House will have to be repeated before another committee of the Upper, for it is a matter of life and death to the companies, and they will die hard. Taking, then, a general review of the position, we cannot help considering the Bill as lost for the present session. Whether the Metropolitan Board and Corporation will renew their nefarious attempt in another, will depend on circumstances. We have never shut our eyes to the fact that some general legislation with respect to metropolitan gas affairs is to be expected. The choice seems to lie between possible confiscation by the local authorities, and amalgamation, with some control by the Board of Trade. Under such circumstances, the decision of the companies can hardly be doubtful. While resisting, to the last extremity, the efforts of the authorities to depreciate the value of their property, the companies might not hesitate to accept from the Government a confirmation of their rights, accompanied by additional obligations for the fulfilment of their duties.

We had no space in our last issue to call attention to the important letter of Mr. W. Livesey, which we published. The clear statement of the past practice of Parliament, in dealing with commercial undertakings, speaks for itself, and requires no comment. The question to-day is, whether or not the present Parliament can be induced to reverse the decisions of preceding, and consent to a virtual act of confiscation. We do not for a moment believe they will consent, but every possible step must be taken to prevent such a catastrophe. Mr. Livesey does right in pointing out that every statutory commercial undertaking is affected by this question. If this Bill should pass, it will be held to justify similar proceedings on the part of every local authority where a statutory gas or other company exists. It is, therefore, a duty incumbent upon all interested in statutory commercial undertakings, to protest against a measure which would constitute a most dangerous precedent.

The Parliamentary Committee of the Metropolitan Board of Works have made a report on the accounts of the Chartered Company, which will be found in another column. It is to be taken into consideration at the next meeting of the Board, and it is very easy to guess what Mr. Newton will have to say about it. But, without anticipating his speech, we may at once point out what must immediately occur to a man of Mr. Newton's shrewd intelligence, but to which the peculiar circumstances of his position may not allow him to give sufficient emphasis. That the price granted by the Revising Commissioners yielded the company a large excess of profit is, of course, admitted. But, then, what has happened? The company have abstained from making any application for a revision of price this year, and, therefore, the price reverts to 3s. 9d. At this price we regard it as impossible that the company can pay their dividends, and thus the directors will at once give back to their customers the excess of profit in the past year. The simple and plain fact is that the customers of the Chartered Company have paid something in advance, for which we have a suspicion that they will obtain liberal interest. We have little doubt that, if the company had applied for a revision of price this year, they might have obtained from 4s. to 4s. 2d., and we consider that their abstention should have been accepted as an act of liberality.

To the larger companies, whose recent Acts embody the revision clauses, the expenses of proceedings in connexion with them, though onerous, are not of much importance. The distribution of the cost is so wide, that the individual consumers, who always have to pay the expenses, are unconscious of any addition to their bills on this account. We are not, however, surprised that the smaller companies, interested in opposing the Bill of the Metropolitan Board, are not in favour of the general adoption of revision clauses, but support the proposition we put forward some weeks ago, that the maximum prices of the Act of 1860 should be retained. They base their objection on the ground of the enormous cost involved in an application to the Board of Trade, which to them and their customers would be a serious matter. We need hardly say that we perfectly agree with these companies in their objection; but, then, we have to contend against the principle adopted by the latest committees, at the instigation of the authorities, and if the Regulations Bill should ever get before a committee, we have no doubt at all that this principle will be reaffirmed. There is much to be said in favour of the revision clauses. They seem to afford a strong protection to the consumer, by compelling a company to make public a reason for raising the price of gas. We know, of course, that the public would be just as well protected by a body of directors sitting in their own board-room, to whom it is always unpleasant to make an advance in price. But the loud-voiced agitators, who are always representing gas companies as robbers, would have these revision clauses, and now we must be content to abide by them. If the Regulations Bill should, as we said just now, ever get before a committee, we hope the smaller companies will show no indisposition to accept the revision clauses, which will most certainly be embodied, if anything like the measure in dispute should become law.

It is greatly to be regretted that the Registrar-General will occasionally, in his reports, wander into the consideration of matters which do not at all concern his department, and it is still more to

be regretted that, whenever he does so, he does it with some unfair motive. Perhaps, however, we ought to acquit the Registrar-General of any participation in these doings, and should more properly attribute them to the small Chadwickian clique, who assume to write in his name. Some popular clamour to-day falling in with the ideas of these gentlemen, we find the following in the "Annual Summary of Births, Deaths, &c., in London and other "Large Cities, for 1874":—

Rates Levied in London.—The returns for the year 1874 are not yet complete, but the Statistical Department of the Board of Trade supplies the following figures for the rates levied in the year that ended in 1873:—

Rates of the Metropolitan Board of Works, dealing with the sewage, embankment, &c.	£218,780
City Corporation and Sewage Commissioners rates .	206,455
Parish rate for vestries expenditure	1,224,701
The rates for relief of the poor.	1,703,774
Water-rates of eight companies	1,022,553
Rates raised by nine gas companies	2,460,256

Thus, besides the rates levied by the local authorities, amounting in the aggregate to £3,853,710, no less than £3,482,809 were raised in rates by nine gas companies and eight water companies. The capital of the nine gas companies was £10,168,513; the excess of revenue over expenditure, £744,785. The capital of the eight water companies was 10,455,293; the excess of revenue over expenditure £618,064. Of all the rates, the gas is the heaviest, and the dividends of the gas companies on their capital are the highest. The great service of these companies is a striking example of the advantages of co-operation, as the heavy taxes they levy are, of the cost incurred by a community without a good municipal organization.

Now the object of the foregoing is perfectly clear. It is intended to stimulate popular prejudice by insinuating that the "*rates*" levied by the metropolitan gas and water companies exceed in the aggregate all the other rates levied in the metropolis; and in a similar manner it is insinuated that if London had a good municipal organization, these heavy taxes would not be incurred. None can be more desirous than we are of seeing the metropolis with a complete municipal organization; but, supposing that blessing acquired to-morrow, neither gas nor water would be a whit cheaper. And then it is a monstrous fallacy to speak of the charge for gas as a "*rate*." We may admit at once, without prejudice, that at present the charge for a domestic supply of water does partake somewhat of the nature of a rate. The principles on which the charge is fixed, and the universality of its incidence, support the analogy. But with gas the case is entirely different. Gas is a manufactured commodity, produced and distributed at great cost. No one is compelled to buy it, and those who choose to have it, take just what they require, and pay for what they consume, and no more. The charge for it is fixed upon true commercial principles—*i.e.*, according to the cost of production, and the interest on outlay. It would then be just as correct to speak of "rates" raised by bakers and butchers as of rates raised by gas companies. And the same might almost be said of water companies, if we had a cheap water-meter of universal applicability. The last sentence in the above quotation is well worthy of remark. The writer appears to acknowledge the great services rendered by the companies to the community, and speaks of them as a striking example of the advantages of co-operation. We quite agree with him, and make the further remark that England owes the vast progress it has made within the last half century entirely to co-operative enterprise. How the country would have fared if the initiation of works for public benefit had been left to municipalities and other local authorities our readers can easily guess. On this matter we need only add the expression of an opinion that, the Queen's press is shamefully abused when Government publications are made vehicles for the dissemination of fallacies such as are contained in the above quotation.

We are sorry to see it is proposed to carry out the threat made on behalf of the Colchester Corporation, and continue the opposition to the gas Bill in the House of Lords. A very sensible and, we might say, magnanimous proposal has been made by the directors, with a view of avoiding expense; and that is to submit the whole question to Lord Redesdale, and abide by his decision. Now, as the noble lord is notoriously hard upon gas companies, the proposal of the directors shows great confidence in the strength of their case, and we should hope the Town Council would adopt the suggestion. One member of the council has, we rather think, rendered himself liable to be called to the bar of the House, inasmuch as he has distinctly charged the committee with having settled the case before it was heard. It seems to be a common belief that it is impossible for a gentleman to be in any way connected with a gas company, and still be an honest man.

The accounts of the Corporation of Bradford for the past year show that the profits on the gas undertaking have amounted to £10,848 12s. 4½d. The total profit made since the undertaking became the property of the Corporation, to December 31, 1874, is £25,975 1s. 7½d., of which £16,000 is due to the borough and general district rate funds, in the relief of rates for 1874. The municipal rates amount to 4s. in the pound, and the borough has a present debt of over two and a half millions.

The Corporation of Manchester are as much worried by objectors to the site proposed for new gas-works, as the Metropolitan Asylums Board are about the site of the Hampstead Hospital, and show a similar determination to adhere to their original design. A Corporation can do that which a gas company cannot, and no doubt the much-needed new works at Manchester will be erected on the borders of Philips Park. It has been clearly proved that well-conducted gas-works are in no way prejudicial to vegetation, and we think it is equally well established that the neighbourhood of gas-works is exceptionally healthy. A new objection to gas-works has, however, been started in Manchester, and it is alleged that they are not conducive to morality. The statement (made by a clergyman, of course) was original, but it evidently made no impression on the members of the corporation. Then a medical man argues that the evolution of sulphuretted hydrogen from foul lime is detrimental; but, unfortunately for his argument, no lime is used in the Manchester method of purification. A suggestion was also made that the gas for Manchester might be manufactured near the pits at Wigan, and thus the cost of the transport of coals be saved. It was not altogether unreasonable, for Wigan is not much farther from Manchester than Beckton from some parts of London. Some of the proceedings at this meeting may be of interest to the opponents of the Birmingham Corporation scheme. It was admitted by Councillor Anderton that the Corporation of Manchester made their profit by the supply of the outlying districts, and that if these could not be supplied, the council must relieve the Gas Committee of the obligation to pay over a certain sum per annum for improvement purposes. The assertion was made, and the truth of it was admitted, that the Manchester Gas Committee have handed over for improvement purposes £50,000 more than they have earned, which will have to be made good, of course, by the consumers in the out-districts. No comment on this is necessary.

Water and Sanitary Notes.

In the annual summary of births, deaths, and causes of deaths, in London and other large cities, for 1874, the Registrar-General observes that the last three years show a marked reduction in the mortality of London, and imply an improvement in the health of the *drained* city. The average mortality of the past three years has been, in fact, only 22·2 per 1000, and by ingeniously contrasting these figures with the average mortality of the 35 years (1840–74), which was 24·2, and of the ten years (1840–49), which was 25·2, the writer arrives at the conclusion that a reduction at the rate of 3 per 1000 has taken place in London. It must be remembered that this very satisfactory result has been obtained in a city supplied with water, much of which is occasionally turbid, and teeming with living and moving organisms, and containing various proportions of "previous sewage contamination." It would, therefore, appear that the character of a water supply has nothing to do with the rate of mortality. What seems, according to these returns, to influence the rate most, is density of population. We have London with 45·1 persons to an acre, with a much-abused water supply, and a death-rate of 22·5. Then we have Nottingham, with 45·5 persons to an acre, and a constant supply of, perhaps, the best water in the kingdom, with a death-rate of 24·8. We pass to Liverpool, with 98 persons to an acre, and a most excellent water supply, with a mortality of 32 per 1000. Glasgow, the water supply of which, as regards quality, is considered, by some, perfection, and as regards quantity is unlimited, has a population of 100 to the acre, with a death-rate of 31·1 per 1000.

There are, however, some curious exceptions, which require explanation. Norwich, with only 11 persons to the acre, and an excellent water supply, has a death-rate of 23·5; and Oldham, with only 18 to the acre, had a mortality of 29·7. He would be a bold man who would impeach the character of the Manchester water supply, which is common to Salford. The death-rate of Salford, with only 25·7 to the acre, is, however, 29·6; and that of Manchester, with 82·8 to the acre, is 30·4. There is a splendid field for some honest, unprejudiced, and competent man, who will undertake an inquiry into the causes of mortality in our large towns. As to the causes of death, we may state our opinion that there is but one line in these returns which is to be implicitly relied upon. In old Registers of Death used to figure the ominous abbreviation, "*sus. per coll.*;" in these days the plain word "execution" is used, and all deaths ascribed to this cause may be believed in. For the rest, the public must take the certificates for what they are worth. The writer for the Registrar-General remarks on the great mortality from bronchitis; but a medical statistician of some eminence has published his opinion, that a large number of deaths are certified as the result of bronchitis, when they should have been set down to phthisis, medical men yielding to the wishes of families who do not wish to have a taint on their constitution recorded.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LX.

Gasholders.

Before giving any of the specifications promised in our last, it may be as well to furnish a few details respecting the employment and cost of material and labour, in order that the managers of small works may be able to arrive at something like an approximate idea of the expense of constructing a tank of a given capacity. A clear understanding on these points, which is essential in every case, seems to be pre-eminently necessary in reference to works of moderate capacity, where the lessons of prudence and economy in making extensions are enforced by the limitation of capital, and where the carrying out of the work often depends wholly upon the sagacity of the manager, unassisted by the supervision of a consulting engineer. The fear which is naturally entertained, in these latter cases, of incurring large outlay that might possibly be avoided or postponed, often causes manufacturing operations to be carried on under considerable disadvantages and loss. An instance of the kind has recently come under our notice in a work producing about eight million cubic feet of gas per annum, the maximum daily make being equal to 50,000 feet. In this case the storeage was hardly equal to a fourth part of the largest daily consumption, so that, at the period of the year, when the profits should be the greatest, a positive loss was sustained, because of the necessity for then employing extra retorts to carry on the supply, these retorts being only charged during the hours of lighting.

The cost of excavating a tank will, of course, be controlled by the nature of the soil in which it is to be constructed; but, speaking generally, this, with the filling in of the earth at the back of the wall as the work advances, may be estimated at 1s. per cubic yard. The cost of removal of the surplus ground from the excavation will be from 1s. 6d. per cubic yard, according to the distance it has to be transported. Frequently, however, there will be irregularities in the site of the works, which will permit of the earth being advantageously deposited thereon, and thus the price will be less than that mentioned.

The cost of concrete will also vary materially, according to the facilities of obtaining ballast, gravel, or shingle—the first consisting of the large stones found in gravel, of about the size of a hen's egg, or broken stones of the same dimensions; the gravel being the mass of pebbles, stones, and sand as taken from the pit; whilst shingle exists of various dimensions, from large boulders to the smallest pebbles. To produce good concrete, the gravel should be free from clay or loam, and composed of from six to ten parts of gravel, ballast, and sand, to one of Portland cement, dependent on the nature of the former. When the ballast in the mass preponderates, and there is an absence of the various-sized pebbles to fill the interstices, the quantity of cement required will be great; but where a proper admixture of pebbles exists, so as to fill the spaces, the quantity of cement will be diminished.

The following method is recommended in some works on building, to ascertain the quantity of sand and cement necessary to intermix with the ballast and shingle:—"Fill a bushel measure with a fair sample of the shingle and ballast to be used. Having a known quantity of dry sand at hand, sprinkle a portion of this over the top, and well shake the measure, by which process the sand will fall down between the ballast, and fill up the spaces between the small particles of material entering into the composition; continue the operation until the measure is filled with sand, and, on ascertaining the quantity used, the required proportion of sand to shingle will be given. Then, with a known quantity of water, pour a portion of this into the measure containing the sand and shingle until full, when the volume of the water employed will give the proportion of cement required." This rule is, however, only applicable to a mixture of ballast and shingle; for wherever gravel is employed, the sand exists therewith, and frequently in excess of the desired quantity, when ballast or other materials, as burnt clay or patent ballast, may be intermixed; but in all cases it is desirable that the concrete, when laid, should have the whole of its interstices filled with the liquid cement. The average price of cement concrete is about 12s. per cubic yard. Lime concrete averages about 8s. per cubic yard.

Brickwork is generally estimated by the rod, which is 272 feet superficial, of a thickness of 13½ inches, or 1½ brick, called the standard thickness, by which it is always computed.

A rod of brickwork is estimated to be equal to 306 cubic feet, and contains from 4300 to 4500 bricks, according to the manner the work is executed, and will require about 184 hods of mortar, or cement, and contain 235 feet cube of bricks, and 71 cubic feet of cement or mortar, and weigh, on the average, about 15 tons. A rod of brickwork requires about 36 bushels of cement, and 36 bushels of sharp clean sand.

The average price of brickwork, set in Portland cement and sand, in equal proportions, is about £18 per rod, or about 30s. the cubic yard.

The cost of rendering in neat Portland cement about ¼ inch thick is about 3s. per yard superficial; this at the same time is flattened with the trowel, so that a smooth surface is produced, which increases the impermeability of the cement. For rendering the dome or cone in the centre of the tank, this price will be slightly exceeded. A bushel of Portland cement, if used carefully, will be sufficient to render from 1½ to 2 yards superficial of wall, but this can only be so applied when the brickwork is in itself to be relied on to retain the water.

In estimating the capacity of a tank, and its corresponding holder, due allowance must be made for the height of the dip or seal, which will depend on the pressure given by the vessel. But it is unsafe, in an economical sense, to work a holder—at least in the daytime, during which the temperature of the atmosphere is liable to continuous fluctuations—without sufficient seal, in addition to that required by the holder.

For instance, let us suppose a small holder to be counterbalanced so as to give only a pressure of 2 inches, for which a seal of 6 inches would be required; in this case, if any material elevation of the temperature of the atmosphere takes place, it would be communicated to the gas, which would expand, and raise the holder, so that, on reaching a certain height, the gas would escape, or "blow." This has been often the cause of serious loss to gas companies, and whenever extreme care is not observed in limiting the contents of gasholders, particularly in summer time, or in warm climates, such loss must arise.

With these preliminary remarks, we proceed to give a few specifications for the construction of gasholder-tanks:—

Specification of a Gasholder-Tank, 33 feet 6 inches in diameter, and 12 feet 2 inches in height, suitable for a Holder 32 feet in diameter, and 12 feet deep at the sides, capable of containing 9500 cubic feet of Gas, allowing 6 inches for Seal.

Excavation.—The ground to be excavated in the place indicated, of a diameter of 37 feet 6 inches, forming an annular space 3 feet 9 inches wide, perfectly level, and 12 feet deep, leaving a dome in the centre of 30 feet diameter at base, and 7 feet high. The excavation to have sufficient slope to prevent it slipping, or to be shored, if necessary, in such a manner as not to interfere with the building. The excavation for the dry well to be made, and a communication between this and the tank, for the purpose of placing the inlet and outlet pipes, which will be done when the work arrives at this point. The excavation to be kept clear of water during the construction.

Concrete.—A bed of concrete 12 inches thick, and 3 feet 6 inches wide, to be laid around the outer part of excavation, and levelled, and to be continued over the whole of the dome a thickness of not less than 9 inches. The concrete to be formed of six parts of ballast and clean gravel with sand, with one of Portland cement, the whole to be well mixed, and placed of uniform thickness alike on the annular space and dome.

A course of footings of 2½ bricks wide to be placed in cement and sand, and perfectly level upon the concrete, also the footings for the four piers, of 3 bricks square. The wall is then commenced exactly 32 feet 6 inches in diameter, and 2 bricks thick to a height of 7 feet 6 inches. The four piers, each 2½ bricks wide, being built up with the wall, each pier tapering in thickness from 3 bricks at the bottom to 2½ bricks at the top, but at the height of 7 feet 3 inches a cast-iron plate with the holding-down bolts, will be built in each of the piers, the holding-down bolts being supported by wooden templates corresponding with the holes at the base of guide-columns, care being taken that they are exactly equidistant, and at the proper height. At the height of 7 feet 6 inches, the wall of tank to be diminished to 1½ brick for a height of 4 feet 9 inches, the piers being continually bonded with the wall. On the wall and piers, reaching a height of 11 feet 9 inches, a course of bricks on edge to be laid perfectly level over the whole of the top. The dome in the centre to be covered with a course of bricks laid flat in concentric rings to the top. On this will be a dwarf pier 2 feet 6 inches high, and 2 bricks square, for the purpose of carrying the king post of holder when down. To build into the wall the four roller guide-plates, and to place eight rest tiles, each 1 foot square and 1½ inch thick, for the holder to rest on. The ground to be filled in behind the wall and rammed as the work progresses, care being taken not to injure the brickwork. The tank, when completed, to be a true cylinder, and perfectly plumb at the sides. All the bricks to be thoroughly wetted previous to being used, each brick being embedded in the cement, so that all the joints are filled.

All the bricks to be laid in Portland cement and clean sand, in equal proportions. The walls, as well as the centre dome, to be afterwards rendered with neat cement to a thickness of not less than one-fourth of an inch, and to be worked with the trowel so as to form a smooth surface.

To construct a dry well adjoining the tank of 3 feet 6 inches internal diameter to the depth of 13 feet, the footings of wall to be two courses of 1½ brick, and on this to be built the wall, of 1 brick thick, set in mortar to the height of the ground level, where it will be finished by a course of bricks on edge, set in Portland cement and sand.

The tank here described is intended for ground of an unstable character, which renders the concrete necessary. It is simple in its construction, and if built with ordinary care will be perfectly sound, and cost on the average about £175.

In small works sometimes the dry well is dispensed with, and a recess is built in the wall of the tank, in which are placed the inlet and outlet pipes. This method, although economical, possesses the disadvantage that the inlet and outlet pipes are not readily cleared in the event of an obstruction.

Should the ground be hard and compact, or a firm clayey soil, the concrete may be dispensed with. Two extra courses of footings being laid perfectly level, the wall is commenced thereon, and from the footings three courses of brick laid flat, are continued over the dome in the centre, the whole being rendered with Portland cement. Should the excavation be in good clay, the cost of the tank will be considerably reduced, as not only the concrete may be dispensed with, but also the brickwork in the centre, reliance being placed on the clay to retain the water, which, since the great and successful experiment at the Imperial Company, has been adopted at other gas-works

with the best results. In such a structure the footings of the wall would be slightly increased in width, and on these the walls and piers would be carried up.

(To be continued.)

Communicated Article.

PARIS GAS COMPANY.

(FROM OUR PARIS CORRESPONDENT.)

The annual report of the Paris Gas Lighting and Heating Company for the year ending Dec. 31, 1874, was presented to the shareholders at the general meeting held on the 23rd of March last, and from it we learn that notwithstanding the continuance of the advanced price of coal during the year, the company's operations were attended with very satisfactory results, the profits realized being greater than in the preceding year.

The consumption of gas, temporarily checked by the war and political events, now continues to advance. During the year 1874 it reached 160,602,000 cubic mètres, or 5,669,250,600 cubic feet, out of which 33,359,000 cubic mètres, or 1,177,572,700 cubic feet, were consumed during the daytime.

The number of public lights in use is 38,498; of these, 21,975 are in the city, 11,042 in the outskirts, and 5481 in the surrounding communes.

The number of consumers at the close of last year was 104,699, or an advance at the rate of 5 per cent. over the preceding year, and 21 per cent. over the year 1869. These additional consumers have caused a considerable increase in the amount of gas consumed, at a time, too, when commerce and industry were compelled rather to restrict their consumption. The report explains that this success is mainly attributable to the interior fitting work which the company have undertaken. In fact, up to the present time, no less than 6503 service-pipes have been gratuitously fitted up, 2213 during the last three years, and 1151 in the year 1874. These 6503 service-pipes, which have put the company to an expense of something like 3,317,000 francs (£132,680), produced in the year a return for gas consumed of 3,320,000 francs (£132,800), and since 1869 they have produced receipts amounting altogether to 16,618,000 francs (£664,720) from 18,250 consumers. This ingenious arrangement has given an extraordinary development to the consumption of gas, which is gradually making its way into every house, and becoming an object of necessity to all the inhabitants of Paris.

The employment of gas as a motive power advances at a somewhat slower rate. During the year 1874, the company only sold 12 Lenoir gas-engines and 25 vertical engines on the Otto and Langen system, the use of which, however, cannot fail soon to become general. The number of gas-engines actually at work in Paris is 177.

The report also refers to the opening of the show-rooms, for the exhibition of gas apparatus, in the Rue Condorcet, an account of which has already been presented to your readers.

The outlay incurred for enlargements of the works, additions to the working plant, and extensions of the mains, amounted, in 1874, to 3,984,023 francs (£159,361), in which sum is included an extension of the mains in the city by nearly 45,000 mètres, or about 27 miles.

The total production of all the company's works has thus been raised to 185 million cubic mètres, or 6530½ million cubic feet per annum.

Coke continues to find an easy sale in Paris, owing to the reasonable rate at which apparatus suitable for its consumption can be fitted up, of which there are 38,098 at present in use; and, although the production of this article last year exceeded that in the preceding year by 1,655,500 bushels, the stock in hand on Dec. 31 last was only 88,000 bushels above the quantity in store at the end of 1873.

The treatment of the tar and ammoniacal liquor produced a profit of 2,638,000 francs (£105,520), showing an excess of one million francs over the year 1872.

In conclusion, the report testifies to the successful results attending the manufacture of compressed fuel from the breeze and coke dust, whereby 330,000 bushels of breeze were utilized during the year, by being converted into a combustible material equal to coke of good quality. The apparatus in this department of the company's works has been fitted up on an extensive scale, and is now capable of producing 100 tons of fuel per day.

The board of direction of the company have deemed it insufficient simply to provide medical attendance for their servants in case of sickness, and assistance for their widows and children in the event of death, by the establishment of a provident-fund, which has this year expended a sum of 167,480 francs (£6700), but have considered it also necessary to assure a retiring pension to those who have been long and faithfully attached to their service. It was, therefore, proposed at the meeting to set apart each year a sum of 60,000 francs (£2400) out of the profits, to form the capital of a pension-fund, and this generous proposition was unanimously accepted by the shareholders. It was also decided that, from the year 1874, a special reserve should be constituted, according to the terms of Article 40 of the statutes, to consist of a reserve of one franc per share, and an annuity of 210,396 francs (£8416), arising from the part repayment of the loan of 7,500,000 francs (£300,000) advanced by the company in 1873 to the city of Paris. This reserve will give to the realized shares of the company an assured value of 250 francs until the termination of the concession.

The following reproduction of the company's working account renders it unnecessary for us to enter into any further details of their manufacturing operations during the period under review. The marked tendency to a reduction in the price of coal, the amicable arrangement come to between the company and one of their principal coal contractors in England, after much contest, on the subject of a contract entered into before the war, and finally the continued increase in the consumption of gas in 1875, all predict very advantageous results for the current year.

WORKING ACCOUNT OF THE PARIS GAS COMPANY FOR THE YEAR 1874.

EXPENDITURE.

	Francs.		Sterling.
Value of gas in store on Jan. 1, 1874	11,745	..	£470
Materials used in Manufacture.			
Coals carbonized	15,693,298	..	£627,732
Coke and tar for heating purposes	2,798,334	..	111,933
	18,491,632	..	£739,665
Manufacturing Charges.			
Salaries and wages	1,650,917	..	£66,037
Maintenance of works and plant	1,046,959	..	41,878
Incidental expenses of distillation	885,208	..	35,408
Purifying material and labour	190,692	..	7,628
	3,773,776	..	£150,951
Cost of Distribution.			
Salaries of engineers and officers	830,684	..	£33,227
Repair and maintenance of mains and service-pipes	402,245	..	16,090
Miscellaneous	179,187	..	7,168
	1,412,116	..	£56,485
General Management.			
Board of direction	150,000	..	£6,000
Salaries	628,758	..	25,150
Office and other expenses	122,491	..	4,900
Service, accidents, relief, &c.	105,478	..	4,219
Law and other charges	26,134	..	1,045
Rents, insurances, and maintenance of buildings	96,485	..	3,860
Interest on loans	3,575,700	..	143,028
Loan redemption-fund	949,500	..	37,980
Share ditto	1,088,500	..	43,540
Cost of experiments, &c.	81,684	..	3,267
Pension and provident fund	102,678	..	4,107
	6,927,408	..	£277,096
Municipal Charges.			
Tax of 0·02 fr. per cubic mètre of gas	2,778,679	..	£111,147
Rating of subsoil	200,000	..	8,000
Lighting, extinguishing, and maintenance of public lamps	403,739	..	16,149
	3,382,418	..	£135,296
State Charges.			
Taxes	349,398	..	£13,976
Subsidy to Control Department	8,000	..	320
Stamps	93,446	..	3,738
	450,844	..	£18,034
Total expenditure	34,449,939	..	£1,377,997

REVENUE.

Produce of the sale of gas	39,993,302	..	£1,599,732
Value of gas in store on Jan. 1, 1875	12,801	..	512
Retort coke	12,744,854	..	509,794
Furnace coke	575,920	..	23,037
Tar	1,792,066	..	71,683
Ammoniacal liquor	250,907	..	10,036
Rent of meters, fittings, &c.	1,739,101	..	69,564
Fire-bricks	193,226	..	7,729
Chemical products	846,793	..	33,872
Sundry works	85,810	..	3,432
Interest and discounts	777,226	..	31,089
Total revenue	59,012,006	..	£2,360,480
Balance in favour of revenue, being profit made during 1874	24,562,066	..	£982,482
Add—			
Balance of profit from 1873 . . 240,240 frs.			
Less liquidation expenses . . 137,339 „	102,901	..	4,116
Total	24,664,967	..	£986,598
Deduct liquidation expenses for 1874	264,967	..	10,598
Balance, being profits available for distribution	24,400,000	..	£976,000
Deduct for dividend on the shares, in accordance with the terms of the treaty	12,400,000	..	496,000
Balance, divisible equally between the Corporation of Paris and the gas company	12,000,000	..	£480,000

The total amount available for distribution among the shareholders is, therefore, as follows:—

	Francs.		Sterling.
Dividend, as per above account	12,400,000	..	£496,000
Moiety of balance, ditto	6,000,000	..	240,000
Second payment by the city on account of loan	50,000	..	2,000
Balance of profits from 1873	408,303	..	16,332
Total	18,858,303	..	£754,332
Deduct first dividend of 12·50 francs, paid in October last	4,098,788	..	163,952
	14,759,515	..	£590,380
Deduct final dividend of 42·50 francs per share (250 francs)	14,280,000	..	571,200
Net balance to carry forward	479,515	..	£19,180

According to the balance-sheet issued in December last, the company's position appears to be as follows:—

	Francs.	Sterling.
Expenses of first establishment	146,695,068	£5,867,802
Capital to meet the above, consisting of—		
Shares . . . . . 84,000,000 frs.	—	—
Bonds . . . . . 59,919,659 „	—	—
	143,919,659	5,756,786
Balance	2,775,409	111,016

It appears, therefore, that the expenses of first establishment exceed, by 2,775,409 francs, the whole of the resources at the disposition of the company.

The great increase in the consumption of gas in Paris, ranging from 212 to 247 million cubic feet per annum, compels the company to further extend their mains and works of canalization, in order to be in a position to furnish, five or six years hence, a supply of 1412 million cubic feet more than they sent out last year. To cover this expense, which will be incurred only as occasion may require, a further issue of 25 million francs, in bonds of 500 francs, bearing interest at the rate of 25 francs per annum, was authorized at the general meeting. These 57,332 bonds, which are reserved exclusively for the shareholders, and are repayable at par by means of a sinking-fund, in 28 yearly payments, commencing on January 1st, 1879, will be issued, at the option of the subscriber, either for 440 francs payable on subscription, or for 470 francs payable in four instalments, with possession from the 1st of January of the year in which each payment is made.

Correspondence.

MALAM'S PROCESS OF GAS-MAKING.

Sir,—In your impression of the 13th inst. there appears a report of a meeting of the Town Council of Aberdeen, at which the Gas Sub-Committee, in their monthly report, stated the result of a visit paid to Dumfries by Mr. Smith, superintendent of the gas-works, that report being almost entirely unfavourable to my process of gas-making.

With that report, which is calculated to create an entirely wrong impression, and made on an erroneous basis, I will, with your permission, briefly deal. In doing so, allow me to allude to the circumstances attendant upon Mr. Smith's visit to the Dumfries Gas-Works. At the time of Mr. Smith's visit I was using a class of coal which, though yielding a good quality of gas, does so in limited volume, the remaining coke being of a very poor quality, and, as I found, totally unfitted for firing material in getting up the heats which my process requires and, to add to my annoyance, I was, owing to railway, arrangements, entirely out of suitable coal to be mixed therewith; the consequence being that I had to use material, in getting up and maintaining the heads, which was totally unsuited to the purpose, the result being that very little above the ordinary heats could, even with the utmost perseverance, be maintained. I may here mention that the whole works were placed under Mr. Smith's control, the testing being conducted by him during the entire night, and that I was not present whilst his operations were being conducted, so that I am unable to say in what manner this was done, no one being present on my behalf competent to check him in his working. I have now no doubt that I was doing myself an injustice in not being present, but I state what was the fact.

Now, let me take his report, and see what he makes out. He says: "The coals experimented on appeared to be a mixture of Drumpark and Auchlochan, four tons of which were carefully weighed and carbonized, yielding 37,500 cubic feet of gas as measured by the station-meter, being on an average 9375 cubic feet per ton, of an illuminating power of 26·49 candles. In order to satisfy myself as to the quality of the coals, I had a sample sent to Aberdeen, and ascertained, from trials in my experimental gas apparatus, that they produced (after deducting 5 per cent.) 9488 cubic feet of gas per ton, of an illuminating power of 26·29 candles, which should be obtained in actual practice on a large scale." Surely Mr. Smith ought to know that testing small quantities of coal by a laboratory experiment is a very different affair from testing the same coal in actual practice on a working scale, and that no one knowing anything of the subject would ever dream of merely allowing 5 per cent. as a difference of calculation. The per centage allowed in calculating the gas yield of coal in laboratory experiments by the highest authorities in the land varies at from 15 to 20 per cent. in favour of practical working. But what does this prove? Why, it simply proves this—that had Mr. Smith made his calculations on a correct basis, even allowing the difference at only 15 per cent. instead of the unheard-of and incorrect difference of 6 per cent., the yield of gas would be 9375 cubic feet per ton as against the result of his test by the ordinary method of 8551 cubic feet, being a difference of nearly 1000 cubic feet in favour of my process, and this without any diminution in illuminating power, his trial of my process at the Dumfries works being made under the disadvantageous circumstances already detailed.

I come now to the analysis of the tar taken from the Dumfries works, which Mr. Smith states was made on his behalf by a firm of tar distillers, which, if it anything like approaches correctness, goes entirely to corroborate what I have already said as to the deficient temperatures at which his experiments were made when here. He says, "I brought samples of tar from the hydraulic main and boxes under the ascension-pipes. These I had analyzed by Messrs. John Miller and Co., Sandilands Chemical Works, who report that it contains from one-fourth to one-third more light oil and naphtha than the tar from the Aberdeen Gas-Works usually does." Messrs. John Miller and Co. may be very eminent tar distillers, or they may not; but this I am assured of, that those best able to judge would never for one instant place their knowledge of such a subject in competition with the acknowledged high scientific standing of such an authority as Dr. Stevenson Macadam, whose certificate is as follows:—

"I have carefully analyzed a sample of gas tar forwarded to me by Mr. A. Malam, engineer of the Dumfries Gas-Works, and find it to differ from ordinary gas tar in being more dense (specific gravity 1045, water being 1000), in containing only 2 per cent. of the lighter naphthas, and in consisting mainly of the heavier tar matters, such as naphthaline, carbolic acide, pyren, and chrysen. The gas tar under examination is therefore practically only of value as a source of dead oil and pitch. All the lighter naphthas have apparently been removed in illuminating gas."

Mr. Smith concludes his report by stating that my process, if adopted at Aberdeen, would cause a loss of a large sum annually, from the ammoniacal liquor being allowed to run to waste. To this I may answer that, since the date of his visit, I have made such trifling alterations as enable me to collect not only the ammonia from the water, but also the colouring matter contained therein, these being at that time the property of the contractor for my tar, he being entitled to remove them.

One word as to the yield of tar from my process, as compared with the old, and it is this: it only amounts to one-half. And why? Because those hydrocarbons which by the ordinary process go to form tar are by mine converted into permanent illuminating gas, and hence the increased yield, and the increase of revenue therefrom, as compared with the insignificant amount derived from the sale of tar. Dr. Wallace, the gas examiner for the city of Glasgow (a very high authority), has reported on my system of manufacturing gas, and deals with it in minute detail; but the following extracts from his report will be sufficient to indicate its nature.

"On the 25th and 26th of September last I made a series of experiments at the Dumfries Gas-Works, with a view to determine the merits of Mr. Malam's invention, which consists essentially in leaving the retort one-third full of incandescent coke, and causing the gas produced in the remaining portion of the retort to pass over it; and in the use of water in the ascension-pipes, which are placed at the back of the retorts; the retorts are wrought at a very high heat. The natural result of the passage of the vapours over the highly heated coke is that the lighter hydrocarbons usually found in the tar are decomposed, and the products of decomposition add to the quantity of gas, while, at the same time, the bulk of tar is greatly diminished, and its nature much changed. Mr. Malam's tar is thick and inodorous. The ammonia water is allowed to go to waste, but I consider that by a slight modification of the arrangements the greater part of it could be saved. The experiments were made with Lesmahagow cannel coal, obtained from the Lesmahagow and Longlee Coal Company, and I ascertained, from trials in my own gas apparatus, that the coal was of the usual first-class quality. I obtained, using charges of 22·4 lbs., 12,450 cubic feet of gas per ton, of an illuminating power of 33·13 candles. Two trials were made at the Dumfries Gas-Works. In the first experiment a ton of coal, distributed in ten retorts worked without the exhauster, gave 13,565 cubic feet of gas of an illuminating power of 30·92, or say, in round numbers, 31 candles. The equivalent of a ton of the coal in pounds of sperm is thus 1442, which is undoubtedly a large and excellent result. Another ton of the same coal was then carbonized, the exhauster being in this case applied. The charge was fully worked off in three hours, and the gas, as measured by the station-meter, amounted to 15,125 cubic feet. Unfortunately, the holder could not contain the whole of the gas, so that, although the contents gave 30·2 candles, I have no doubt that if the whole gas had been collected it would have been sensibly less. If the illuminating power is assumed at 29 candles, the equivalent of a ton of coal in pounds of sperm is 1505 lbs. I consider the results above detailed satisfactory in showing, at least, that the yield of gas may, by the process, be very considerably increased, and without a greater deterioration in the quality than that which results from the use of high heats in gas-works of the ordinary construction."

And what say the directors of the Dumfries Gaslight Company, where the process has been so thoroughly tested in actual practice, the whole of the gas supplied in Dumfries and Maxwelltown having for more than a year been manufactured exclusively on my principle. They certify that previous to its use "the company had very great difficulty in furnishing a sufficient supply of gas in winter; but during the past season nothing of the kind was experienced, and in fact some of the benches have not yet been kindled. This can only be attributed to the success of Mr. Malam's new system in extracting a much larger quantity of gas from the coals. The directors find the result of the year's working (1873-74) to be a saving of 986 tons of coal, being equal to 30 per cent. as compared with the previous year under the ordinary method of working." Surely, in face of such testimony, any further remarks on Mr. Smith's report would be superfluous; but I may say, in conclusion, that I will gladly afford every facility to those interested in the subject, of proving for themselves whether or not the experiments conducted by Mr. Smith give a true indication of obtainable results.

A. Malam.

Gas-Works, Dumfries, April 15, 1875.

THE SOUTH METROPOLITAN GAS COMPANY AND THEIR PRICE.

Sir,—The opinion which has been several times expressed in your "Circular to Gas Companies," that the South Metropolitan must shortly raise the price of gas, has led to the supposition that an advance is imminent. I shall, therefore, feel greatly obliged if you will allow me to state that, so far as I can see, there is no present probability of such an event.

I consider the worst is over, and shall be much mistaken if the dividend in 1875 is not earned; at any rate, in my opinion, the deficiency will be very slight, notwithstanding the increase of capital, which is proportioned to the increase of the business.

George Livesey.

South Metropolitan Gaslight and Coke Company, Old Kent Road, April 19, 1875.

[We have never expressed an opinion that a rise was *imminent*; all we have said is, that it "must, sooner or later," take place.—Ed. J. G. L.]

Death of Mr. John Haswell.—We have just heard of the death of this gentleman, about a fortnight ago. Deceased, who was universally respected for his urbanity and kindliness, filled the post of manager of the British Gas Company's works at Hanley for twenty-eight years. Deceased, who was 67 years of age, leaves a widow and one child.

Death of Sir John Gray, M.P.—Sir John Gray, the member for Kilkenny, died at Bath on the 9th inst. The deceased was born in 1815, and had long been a member of the Dublin Corporation. For the prominent part he took in the introduction of the Vartry water system into the city he was knighted in 1863 by the then Lord Lieutenant, the Earl of Carlisle. He was a director of the Alliance and Dublin Gas Company.

Death of Mr. John Foxall.—We regret to learn that Mr. John Foxall, manager of the Beverley Corporation Gas-Works, died at his residence early on Thursday morning last, after a very brief illness. He was present at the Town Council meeting on Monday afternoon, and was out as usual on Tuesday, but towards evening he became unwell, and gradually got worse. Mr. Foxall had held his appointment for nearly 30 years, and was 51 years of age. He was a native of Halifax, and was well known in the West Riding.

Sale of the Wetherby Gas-Works.—On the 31st ult. the Wetherby Gas-Works were sold by auction by Messrs. Cundy and Son, of Leeds, to Messrs. Huggans and Wades, of Pudsey, for the sum of £2700.

Parliamentary Intelligence.

GAS AND WATER BILLS, 1875.

MONDAY, APRIL 12.

In the postponed case of petition for the Margate Consumers Gas Bill, the Standing Orders were found by the examiners to have been duly complied with.

HOUSE OF LORDS.

MONDAY, APRIL 12, 1875.

Leave was given to the Select Committee to consolidate the Inverness Water and Gas (Purchase, &c.), and Inverness Water and Gas (Works, &c.) Bills.

The LORD CHANCELLOR acquainted the House that the further Standing Orders applicable to the Truro Water Bill have been complied with; and that no further Standing Orders are applicable to the Heckmondwike Gas, British Gas Company (Norwich Station), Colchester Gas, Leicester Water, and Oxford (Corporation) Water Bills.

The Cleveland (Skelton) Gas Bill was read a second time, and committed.

The Broadstairs Gas Bill, brought from the Commons, was read the first time, and referred to the examiners.

The South Staffordshire Water Bill was referred to a Select Committee, consisting of Earl Belmore (chairman), Earl Ellesmere, Lord Monteagle of Brandon, Lord Elgin, and Lord Cottesloe, to meet on Wednesday, April 14.

Petitions were presented against the Leicester Water Bill, from Corporation of Leicester; and in favour of the Cardiff Improvement Bill, from Canton (Llandaff) District Board of Health.

TUESDAY, APRIL 13.

The LORD CHANCELLOR acquainted the House that no further Standing Orders are applicable to the Hindley Local Board, and Kilmarnock Water Bills; that the further Standing Orders applicable to the Longton Gas Bill have not been complied with; and that the Standing Orders have not been complied with in respect of the petition for an additional provision in the Barrow-in-Furness Corporation Bill.

The Ashton-in-Makerfield Local Board Bill, brought from the Commons, was read the first time, and referred to the examiners.

THURSDAY, APRIL 15.

The Heckmondwike Gas Bill was read a second time, and committed.

Petitions against the following bills were presented:—Colchester Gas, from Corporation of Colchester; Hindley Local Board, from Leeds and Liverpool Canal Company; Oxford (Corporation) Water, from Conservators of the River Thames; Pontypridd Water, from Troedyrhiw Coal Company; Truro Water, from Corporation of Truro.

FRIDAY, APRIL 16.

The LORD CHANCELLOR acquainted the House that the further Standing Orders applicable to the Broadstairs Gas Bill have been complied with; and that no further Standing Orders are applicable to the Carmarthen Gas, and Cleethorpe Gas Bills.

The examiners certificates of non-compliance with the Standing Orders in the case of the Longton Gas Bill, together with the petition for additional provision in the Barrow-in-Furness Corporation Bill, were referred to the Standing Order Committee.

The British Gas Company (Norwich Station), Colchester Gas, Leicester Water, Oxford (Corporation) Water, and Truro Water Bills, were read a second time, and committed.

The Cardiff Improvement Bill was reported, with amendments.

The Bath Gas, Eastbourne Water, and Ossett-cum-Gawthorpe Local Board Bills, brought from the Commons, were read the first time, and referred to the examiners.

A petition against the Kilmarnock Water Bill was presented from the Provost, &c., of Kilmarnock.

HOUSE OF COMMONS.

MONDAY, APRIL 12, 1875.

The Weardale and Shildon Water Bill was reported.

The Ashton-in-Makerfield Local Board Bill was read the third time, and passed.

The Bath Gas, Eastbourne Water (amendments made), and Ossett-cum-Gawthorpe Local Board Bills, as amended, were considered; to be read the third time.

The following petitions have been withdrawn:—London and North-Western Railway Company, as against the Longwood Gas Bill; Lord Howard of Glossop, and Manchester Carriage Company, Limited, as against the Manchester Corporation Water and Improvement Bill.

TUESDAY, APRIL 13.

On the motion of Sir CHARLES FORSTER, it was ordered that the minutes of the evidence taken before the committee on the Stockton, Middlesbrough, and Yarm Water-Works Bill, in session 1851, be referred to the committee on the Stockton and Middlesbrough Water Bill.

The Alford Gas, Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Water, Millom Gas and Water, and Portishead District Water Bills were reported.

Report presented, that no Standing Orders not previously inquired into are applicable to the Greenock Water Bill (Lords); bill to be read a second time.

METROPOLIS GAS COMPANIES BILL.

The second reading of this bill was deferred till Tuesday, May 4.

A petition in favour of the Stockton and Middlesbrough Water Bill was presented from the Normanby Local Board.

The Waterford Improvement, and Newport (Monmouthshire) Gas Bills were referred to a committee, consisting of Mr. Heygate (chairman), Viscount Holmesdale, Mr. W. H. Foster, Mr. Carpenter Garnier, and Mr. A. Bonham-Carter (referee), to meet on Tuesday, April 20.

WEDNESDAY, APRIL 14.

The Pemberton Local Board Bill, as amended, was considered; to be read the third time.

The Margate Consumers Gas Bill was read the first time.

On the motion of Sir CHARLES FORSTER, it was ordered that the minutes of the evidence taken before the referees on the Manchester Corporation Water-Works Bill, in session 1865, be referred to the committee on the Oldham Corporation Water Bill.

A petition against the Waterford Improvement Bill was presented from the owners of lands, &c., situate in the Barony of Kilculliheen and County of Waterford.

The petitions of the Manchester and Saltersbrook Turnpike Road Trustees against the Manchester Corporation Water and Improvement Bill, and of Corporation of Ashton-under-Lyne against the Oldham Corporation Water Bill, have been withdrawn.

THURSDAY, APRIL 15.

The Bath Gas, Eastbourne Water, and Ossett-cum-Gawthorpe Local Board Bills were read the third time, and passed.

The Slough Water Bill was reported.

METROPOLIS WATER SUPPLY AND FIRE PREVENTION BILL.—Report presented, that the Standing Orders have been complied with. Bill to be read a second time on Friday, May 14.

A petition against the Waterford Improvement Bill was presented from lessees and occupiers of lands, &c., in the Barony of Kilculliheen and County of Waterford.

The *locus standi* of the following petitioners against the Waterford Improvement Bill has been disallowed:—(1) Owners, &c., of foreshores of the Rivers Suir, Nare, and Barrow, except as against clauses 88 and 89, and so much of the preamble as relates thereto; (2) Commissioners for Improving the Port and Harbour of Waterford, except as against clauses 74, 77, 78, and so much of the preamble as relates thereto; (3) Burgesses and Grand Jury Ratepayers of the borough of Waterford.

WATER SUPPLY IN RURAL DISTRICTS.

Sir G. JENKINSON asked the President of the Local Government Board whether, having in view the inadequate supply of water for drinking and other purposes in many towns, rural villages, and districts throughout the country, Her Majesty's Government were prepared during the present session with any measure to remedy this evil; and, if not, whether the Government would consent to an inquiry into the subject by a Royal Commission, for the purpose of ascertaining the wants of various rural districts, and the best method of storing water where needed.

Mr. SCLATER-BOOTH: I stated very recently, in reply to a question addressed to me in this House, what new powers and facilities in respect of water supply were proposed to be conferred by the Public Health Bill of this session. The Government have no further legislation to propose on the subject at present. In reply to my honourable friend's further question as to a Royal Commission, the Government have not yet had time for its consideration. In considering it, their object would be to adopt such a course as might lead to a practical conclusion with the least possible delay.

FRIDAY, APRIL 16.

The Maidenhead Water Bill, as amended, was considered. Amendments made, and bill to be read the third time.

A petition against the Margate Consumers Gas Bill was presented from Sackett Tomlin and others.

The petitions have been withdrawn of Denton Local Board of Health and Audenshaw Local Board, as against the Manchester Corporation Water and Improvement Bill; Pontefract Gas Company, as against the Pontefract Borough Extension Bill; North-Eastern Railway Company, as against Stockton and Middlesbrough Water Bill.

METROPOLITAN GAS COMPANIES ACCOUNTS.

Sir C. DILKE: I beg to ask the President of the Local Government Board when the annual accounts of the metropolitan gas companies will be presented.

Sir C. ADDERLEY (in the absence of Mr. Sclater-Booth) said the Metropolitan Gas Act of 1860 required the companies to send in their accounts within two months of the time to which they were made up, and it was most likely that the accounts referred to by the honourable baronet would be presented by the middle of June.

SATURDAY, APRIL 17.

A petition was presented against dispensing with Standing Order 131, in the case of the petitions of owners of lands, &c., and lessees and occupiers of lands situate in the barony of Kilculliheen and county of Waterford, against the Waterford Improvement Bill, and a petition in favour of the Bill from Waterford and Limerick Railway Company.

The petitions have been withdrawn of Lee Conservancy Board against the Commercial Gas Bill, and of Charles Shaw against the Oldham (Corporation) Water Bill.

HOUSE OF COMMONS COMMITTEES.

TUESDAY, MARCH 16.

(*Before Admiral* EGERTON, *Chairman*; *Mr.* ASSHETON, *Viscount* NEWPORT, *and Mr.* HOPE-JOHNSTONE.)

NEATH DISTRICT WATER BILL.

(*Continued from page 522.*)

Mr. RICHARDS addressed the committee on behalf of the Corporation of Aberavon. He said that the petitioners were the local sanitary authorities, to whom Parliament had entrusted the power of supplying water to the population. It had been stated that the water supply at Aberavon was in a very disgraceful state, but he believed it would be found that such was not the case. He did not mean to say it was as well supplied as it might be; but besides the water supplied from the pipes there were a number of wells and tanks—the latter of which had been constructed by private persons as well as by the corporation. The corporation had also entered into negotiations with Mr. Talbot for the purpose of adding to the water supply of Aberavon. They consequently thought it somewhat hard that when they were using reasonable efforts to supply the town, a parcel of people with a mere commercial motive, and with no respect for the place, should come and supersede them intheir duty. It was not likely, even if Aberavon were not properly supplied, that persons of that sort, coming to work as a commercial speculation, would very soon carry out a proper supply, unless they found that it would pay them to do so. The committee, before sanctioning the scheme of the promoters, should be quite sure that the local authorities had failed in fulfilling their duty. They had carried out the drainage of the place, and other sanitary improvements and arrangements were being made to give a further supply of water. He trusted that the committee would not place that supply in the hands of a company, but that it would be left to the proper sanitary authorities. Something had been said as to the necessities of Taibach, but he did not see that there was any necessity for coming through Aberavon to supply Taibach. With regard to Cwmavon, there was already a plentiful supply. As to the mode in which it was proposed to supply Aberavon, the water would come from the coal measures, and that was unfit for drinking or for domestic purposes. It was stated that there would be time for the water to subside in the reservoirs, and would become clear, and would flow down in an unobjectionable state. His clients, taking an entirely different flow of water, strongly objected to being provided with the Pelenna water, having a supply nearer home, which was not subject to the drawback of contamination. Under these circumstances, he asked the committee to say that there was no necessity for such a company as that of the promoters.

Mr. Edward Jones, examined by Mr. WILL.

I am at present the Mayor of Aberavon. Since 1861 I have been connected with the affairs of the Town Council. I should think the population of the town was nearly 4000. Having obtained our charter in 1861, in 1867 we proceeded to carry out various public works. In 1866, as a corporation, we applied for an Act of Parliament to take over the gas-works, and also to take the water supply in our own hands. The gas supply is now in our hands. The town authorities have from time to time kept the springs in repair and erected tanks, and the town, although not adequately, is moderately supplied with water. We have been remarkably free from a prevalence of disease. The locality abounds with springs. I certainly do not consider it would be for the public benefit of the district for the bill before the committee to pass, and thus take the water supply out of our hands. We have already expended a great sum of money in drainage, and we think it would be hard for a company to come and deprive us of what would be a source of revenue. As a corporation, we have unanimously passed a resolution to carry out the water supply of the town ourselves.

Cross-examined by Mr. MICHAEL: If the bill before the committee becomes

law, the promoters may take seven years before they lay down distributory mains. We have no estimate of what our water-works would cost. Whatever their cost, it must be paid out of the rates. I thought by our supply of water to the inhabitants we should ultimately realize a profit.

Re-examined by Mr. WILL: Whatever profit we get from having gas and water in our hands will go to benefit the ratepayers.

Mr. *Daniel*, examined by Mr. WILL.

I am an alderman and justice of the peace for the borough of Aberavon, and was mayor from 1871 to 1874. During my tenure of office a committee was appointed to carry out the water supply to the town. I was a member of the committee. We visited various sites, and ultimately fixed upon a portion of Mr. Talbot's property. He expressed his willingness to allow the corporation to obtain a supply of water from his land. We believe that we can carry out that supply. Our only desire is to give a good and sufficient supply of water as cheaply as possible. If the supply is left in the hands of the corporation, it will be provided cheaper than if allowed to go into the hands of this company. There is no present urgency for water at Aberavon for domestic purposes, but there is for drainage. The main drain is well flushed from the river. The corporation will be able to carry out works for a water supply in a much less time than seven years.

Cross-examined by Mr. MICHAEL: I do not know that I was one of the principal speakers at a meeting held with respect to the Neath Gas Bill. The matter of a water supply has been under consideration every year since 1867. It has not been carried out, chiefly because the town is pretty heavily burdened. If we construct water-works, it will be an additional burden. We have got Mr. Talbot's consent to the proposed works of the corporation. Mr. Talbot told me himself, when I went to him with regard to this water supply, that he should be glad to let us have any water for the supply of Aberavon if it were required. We have to pay him for the water on the Aberavon side. Our proposed site is about one mile and a half from the town of Aberavon itself. The elevation, I should think, is from 100 or 120 feet to 150 or 160 feet above Aberavon. The height of the top of the highest house in Aberavon is about 35 feet. I do not know the estimated cost of this supply. I have no doubt that it would be a source of great benefit to the ratepayers. Of course, if it turned out to realize a profit, it would only be from one pocket to the other. I have not formed any estimate of the quantity of water that could be obtained from that source. There are two great streams there, which come from the valley at the back of the highest part of the mountain. The mountain streams of that district are never dry. The distance of our proposed site from the Cwmavon works is about a quarter of a mile. The water does not run through the works. The stream is partly utilized by the works. I do not know that they have any right to use this water, but they do use it. We have not applied for permission to use the water. I cannot tell you how much land we propose to take. We have not agreed as to the price to be paid for the land.

Re-examined by Mr. WILL: We have consulted an engineer on the subject. Mr. Talbot's land, from which we propose to obtain our supply, is above the valley. The land of Mr. Talbot's is not in the Dufferin valley, where we previously proposed to go. We have no reason to expect any hitch in carrying out our proposal, and if there should be, we shall be able to get a supply from a spring of pure water coming down from the mountain side.

WEDNESDAY, MARCH 17.

Mr. *Benjamin Morgan Davis*, examined by Mr. WILL.

I have lived for five years in Aberavon, and am a member of the Town Council. I know the district well—every acre of it—and also the proposed reservoir. I am the owner of considerable property in the neighbourhood. The property is full of coal, and it is being worked very largely at present. I have reason to believe that it will be more extensively worked. From the situation of the land the water of the collieries must come down to the place where it is proposed to place the reservoir. Last summer was a dry season. Putting aside exceptional occasions, there is not an urgent cry for water at Aberavon. It is one of the healthiest towns in the county of Glamorganshire. At the time of the cholera epidemics in 1848 and 1866 we were much better off than the neighbouring towns. I was one of the Town Council in 1873, when they were engaged in looking out for an improved water supply, and we have been using due diligence to investigate the various sources in the district. The operations with that view were postponed for a time in order to obtain some experience of the dry season. After investigating several sources of supply, we ultimately fixed upon Mr. Talbot's land, and we have reason to believe that we shall be able to obtain the required supply, and to afford the inhabitants the benefit of it.

Cross-examined by Sir E. BECKETT: We have plenty of water at present. The corporation have taken up the matter of the water supply. We have an ample quantity of water for the winter, but not quite sufficient for the summer. The effect of the insufficient quantity last summer has caused us to take steps to get an increased quantity for the future. The charter was granted to the Corporation of Aberavon about 10 or 12 years ago. The corporation have passed a resolution that they will at once take proceedings to obtain an increased water supply for the town; and a resolution in favour of a definite water scheme. I have not got any books here showing that such resolutions were passed.

Mr. WILL said that he was not challenged to produce the books containing the resolutions.

Sir E. BECKETT stated that it was his duty to prove the resolution, and the books ought to have been brought to prove what had been asserted.

Witness: I know the district of which I am speaking—it is a coal district. I was brought up as a chemist and druggist. I was not an analytical, but a dispensing chemist.

Re-examined by Mr. WILL: There is not sufficient water for the purpose of draining the water-closets, but so far as regards ordinary domestic purposes the district is very well supplied indeed. It is because there is not a sufficient supply for the water-closets that we desire to make a further provision. We have ample means and ability to manage our own affairs, and there is no better intention in any corporation of Wales than in ours to carry out such a work.

By the CHAIRMAN: I have a tank that will hold 2000 gallons. The tanks are situated at a good elevation. There is a large iron tank at nearly every house. I have made six tanks myself. The houses are mostly in terraces.

By the COMMITTEE: I know the place where it is proposed to make the reservoir very well indeed. There are coal workings above the embankments. The drainage from the coal workings there will come into the reservoir; and the effect of that would be that an immense quantity of sulphur would get into the water. I have made no analysis of the water, as I have no chemical knowledge with respect to water. The wells are supposed to be very pure. I have never myself attempted to analyze the water taken from them, as I could not do it. It is a medium kind of water. I have never heard people complain of it. I have never known my tank to be entirely dry. The water at Neath is like pea soup.

Mr. *Philip Williams*, examined by Mr. WILL.

I am a surveyor, living at Cwmavon. I took four samples of water from the district. One was taken from the Pelenna River, another from Gwen-Ffrwyd, another from a spot near to a colliery, and the other from the water of a colliery. I took three of the samples from above the site of the proposed reservoir.

By Mr. MICHAEL: I did not take any water as a sample from the site of the reservoir.

By Mr. WILL: I did not take a sample of water from Mr. Talbot's property. I have examined his property.

Sir E. BECKETT (to the committee): I think the time is now come when I must ask you how far we are to go into the question of Mr. Talbot's property. It cannot be brought forward here.

The CHAIRMAN: I do not think we can go into any alternative scheme which is not before us.

Mr. WILL: It is not an alternative scheme. We are not setting up a rival scheme. It is sufficient if I show that it is the intention of the corporation to carry out the water supply for themselves, whether it will come from Mr. Talbot's property or not.

Sir E. BECKETT: It is either Mr. Talbot's water or no water; it must be an alternative scheme or nothing. It seems that all this time the corporation had in their heads a definite source of supply, and they gave us no information about it, otherwise we should have been prepared with evidence respecting it.

After further objections being raised against questions respecting Mr. Talbot's property being put to the witness, the room was cleared in order that the committee might give their decision on the point of questions with respect to an alternative scheme being put to the witnesses.

On the opening of the room, the CHAIRMAN said the committee are of opinion that Sir E. Beckett's objection holds good. The alternative scheme has not been sufficiently described, and cannot, therefore, be discussed.

By the CHAIRMAN: I have walked up the district of the Pelenna valley several times. On tasting the water I found it very bad. I should say there are about four collieries around the site of the proposed reservoir, but there are about seven or eight different openings. From the position of the collieries the drainage from them will find its way to the proposed site of the reservoir. It is a matter of necessity—it must go in that direction unless there are appliances to turn it in a different direction.

Cross-examined by Sir E. BECKETT: I cannot say how much worse the water will be owing to the drainage, but I should not like to drink such water.

Mr. *Richard Jenkins*, examined by Mr. WILL.

I am a mineral agent, and live at Cwmavon. I have the charge of the mineral agency of extensive works in the neighbourhood of the Governor and Company of Copper Mines. I have examined the Pelenna district. There is a stream called Gwen-Ffrwyd immediately above the proposed site of the new reservoir. That stream flows into the reservoir. The character of the water in that stream is to some extent dirty mineral water. It is not fit for people to drink. The water of the Pelenna stream is somewhat polluted—it is discoloured. The workings in the neighbourhood are increasing. There are several new ones at work, and I apprehend if they are further developed the pollution of the two streams will be increased.

Mr. *Edward Daniel*, examined by Mr. WILL.

I am a mining engineer, carrying on business at Swansea. I am mining engineer to many owners in the locality, and know the Pelenna district. I have been engaged assisting in the preparation of statistics for the Royal Coal Commissioners of 1861. I have carefully examined the condition of the water supply proposed to be obtained in this district. It is good water if the water of the mines is not allowed to go into the streams. From the situation of the ground the water of the collieries of necessity finds its way into the two streams. As an engineer I do not know of any way by which that could be avoided without erecting pumps. As the workings of the collieries are being developed, there is no question but that the surplus water which now goes through the Pelenna will drain out through the workings.

Cross-examined by Sir E. BECKETT: There are about three or four collieries now working. I believe a large proportion of the whole stream comes from the collieries. I cannot say what proportion, because I have not gauged it. I do not think the water can be so pure when it comes from the collieries as it would otherwise be. I have never had any kind of experience of water taken out of a large reservoir which has had colliery water run into it. I hope I never shall. There are several houses above the reservoir on the two branches of the stream. I have no idea of the number. I have been told there are eight. I should say there would be over 20 houses that would be drained into the stream. They are workmen's cottages. There will be more. There is coal all over the county, but in some cases it does not crop up as it does in this particular valley. There are certain valleys from which water can be obtained without going into the coal district. Of course, the Ordnance map represents the whole of the coal district, but all that is represented as coal does not come up to the surface. In this particular district of the Pelenna the veins crop out, and they are worked from the surface. Generally speaking, all the district marked on the map is coal.

Re-examined by Mr. WILL: The water, such as it is, as it comes from the collieries, is much impregnated with sewage, and that is the sort of stuff that will flow from the reservoirs.

By the CHAIRMAN: There would be much less surface water come to the reservoir than there is at present.

By the COMMITTEE: The nearest one of the cottages is about a quarter of a mile from the reservoir.

Mr. *Baldwin Latham*, examined by Mr. WILL.

I am a civil engineer, and carry on my profession at No. 7, Westminster Chambers. I have had considerable experience in matters relating to the construction of water-works, and my attention has been directed to the scheme now before the committee on the part of the Corporation of Aberavon. I have made a thorough examination of the district in the neighbourhood. From my examination of the district I do not see any difficulties in the way of the corporation supplying it with water. This bill is primarily for the purpose of supplying Neath. The principal portion of the district which is intended to be supplied is in the Neath watershed, whereas the water is to be taken from the Avon watershed. The total area included in the limit of the bill is 77,585 acres. Of that 15,884 are in the valley of the Avon and Dufferin, and 54,701 are in the Neath drainage area. There is no doubt that my experience leads me to say that water being one of the sanitary requirements, should be in the hands of the corporation rather than in the hands of a company, which simply trades for a profit. I have made a careful examination of the valley, and have noticed the character of the water which it is proposed to impound by the reservoir; and, in my judgment, it is not of a proper quality to be supplied to the district proposed to be supplied. It is certainly, to a great extent, polluted, and as the district increases the mineral workings will increase also.

Cross-examined by Sir E. BECKETT: I have carried out several gravitation works. I have carried out works at Croydon, in Berkshire (for Mr. Campbell), in Devonshire, at Skipton, and at Doncaster. The reservoir in Berkshire will contain as much as 200 million gallons of water, and supplies the irrigation works upon the estate of Mr. Campbell. It is an impounding reservoir. The reservoir in Devonshire, which I constructed for the local board for the supply of the town, is a gravitation reservoir, and is capable of holding 25 million gallons of water. I have prepared designs for the construction of works in the neighbourhood of Barnsley. They are not what are called the Barnsley Water-Works; Mr. Hawksley was the engineer of them.

Re-examined by Mr. WILL: As an engineer I have been concerned in this scheme for some time. It is not absolutely necessary for me to design and lay the works out. The mere construction of a reservoir is very difficult indeed. The reservoir in question is a very large one. The water proposed to be impounded is not of such a quality that I could recommend it to the committee as fit for general use, without it was considerably purified.

By the CHAIRMAN: The water will be very much polluted by sewage

matters. I counted as many as 70 houses in the valley of the proposed reservoir.

The CHAIRMAN: There seems to be a great difference of opinion as to the number of houses in the valley.

Mr. WILL here stated that he had concluded his evidence, with the exception of the examination of Dr. Letheby, who, on account of an attack of bronchitis, would not be able to attend until somewhat later in the day; and he (Mr. Will) would therefore ask the committee to allow of that evidence being given when Dr. Letheby appeared.

The committee assented to that course being taken.

Mr. G. SOMERSET (on behalf of the Corporation of Neath) then addressed the committee in opposition to the bill. He desired to call their attention, shortly, to the objections made by his clients against the scheme. They objected because it would leave them in a very unpleasant position with respect to the quality of the water supplied to them for a great number of years. It would take away from them the power of sale which they had enjoyed from 1861, and it would also impose upon them such an amount of water-rates as would be a grievous burden to the town. The petitioners were the urban and sanitary authorities of Neath, and had been charged with powers under the Local Government and Sanitary Acts. He asked the committee to reject the bill *in toto*. It was known that there were two separate undertakings, the Neath and the Briton Ferry, and they were as distinct as if they were under different Acts of Parliament. The Neath undertaking was defined in an Act of 1861. Mr. Hawksley had stated in his previous evidence that the present bill was brought forward not only with the concurrence of the old company, but that they had been informed of it, and had consulted with him, and they were, of course, parties to the concern, although they did not hold that out to the public. The real position of affairs was that in 1861 the present company—the Neath undertaking—was established; and in 1865 powers were granted to them to obtain more money, and what was called the Briton Ferry undertaking was then established under an Act of Parliament; but they were entirely distinct in every possible respect. After the passing of the two Acts, the Neath Company obtained their powers to raise the sum of £5500 in ordinary shares, and to borrow £1500, which, with their previous capital, made a total of £13,000. It was, however, stated by Mr. Hawksley that they had no funds to do what they ought to have done last year, but he (Mr. Somerset) held in his hand something that would prove to the contrary. It was something that he could not obtain from the examination of any of the witnesses, for not one single person connected with the old company had been before the committee as a witness to give evidence on matters of finance, or about the state of the works. There were, however, he was told, in the room, during the whole of the proceedings, the general manager and secretary of the company, both of whom could have given information as to the state of the finances. Mr. Hawksley had also told the committee that for the sum of £2000 or £3000, all that was required at Neath could be done. He had said that he was not the engineer of the old company, but that a gentleman of the name of Williams was the engineer; and yet that gentleman, who was in the room, was not called as a witness. That was an important point, because he could have told the committee the exact state of things as to the condition of the works, and the possibility of future supply. Witnesses had been examined to discover, if possible, the real position of affairs, but not one witness was called who could give information on that point. With regard to the new company, no one had been examined, with the exception of Mr. Hawksley, and he had said that the bill was promoted by himself, his friend (Mr. Baxter), the solicitor, and three other gentlemen, none of whom had been examined; therefore there had not been any one to give any information as to the present state of affairs, either financially, engineering, or otherwise, connected with the present company; nor had there been any one except the engineer for the bill to state what the future of the company would be, either financially or otherwise. It was very material, in such a bill as the one before the committee, that such evidence should be given, because there was no compulsory power to enforce the promoters to carry out their works. They might leave undone whatever they chose, and place the petitioners in a bad position, by doing no necessary work at all for the accommodation of Neath, who were thus entirely in the hands of the company. In five or six years the company might, after effecting certain works, apply to Parliament, and obtain an extension of time for the completion of their scheme. By the Act of 1847, the ratepayers of Neath, now that the company had reached the maximum, and were able to pay a 10 per cent. dividend, were entitled to a diminution of their rates. But that was impossible, if a further large expenditure were incurred. There had been for a considerable time objections to the supply of water. Last year the corporation endeavoured to secure a better supply, and negotiations with the company had, in fact, been going on almost up to the present hour. The question was brought before a committee of the House, and the decision of that committee was that the Neath Company should at once commence the necessary works to meet the requirements of the corporation. There were objections made as to the want of filter-beds in July, and, up to the time of the present bill coming before the committee, application after application was made to the company to make the required filter-beds, but no notice had been taken of those repeated applications. He believed, therefore, if the present bill passed, the petitioners would have no power to enforce the company to carry out the necessary works. With respect to the amount of money necessary to carry out the improvements of the ponds and providing filter-beds, Mr. Hawksley had said last year that £2500 would meet all the requirements of Neath for a considerable time. He now said that that would be practically true, were it not for something which had occurred since his former estimate was given. He stated now that when he went down to the district for the purpose of the present scheme, he had ascertained that a large quantity of water was being abstracted from the ponds, and that that abstraction was made by a reverend gentleman in the district, who urged that he had the right to take the water, which he had taken for some time past. Mr. Somerset said that, with reference to that claim, it appeared to have been totally disregarded last year. Mr. Hawksley appeared as the witness for the company last year—he was the only witness the company presented to the committee, and he made the whole of the case for the company—therefore he must have been instructed as to all the facts by the gentlemen connected with the company, who must have known if there was such a claim. The statement of Mr. Hawksley now was, that his previous estimate of £2500 would be correct had it not been for the discovery of this claim; but he (Mr. Somerset) would ask why the secretary of the company was not called to say that the discovery was made since 1874. The claim must have existed in 1874 if it existed at all. It could be proved that the cut from which the water flowed had existed for over 30 years. The gentlemen who had instructed Mr. Hawksley must have known all the particulars with respect to the claim, and yet they never made their appearance as witnesses. It seemed pretty conclusive evidence against the claim. Mr. Somerset said it appeared that one of the objects of the bill was to get rid of the moral obligations which the company came under last year. What would be the position of things if the bill were passed? The corporation had really no power whatever to compel the promoters to carry out any necessary works that were required to be done for the people of Neath. Calling attention to Sir E. Beckett's observations last year, which appeared to fit the present case, Mr. Somerset quoted the words:—"We, the company, must come to Parliament, and then Parliament will have control over us, and if we are able to pay a 10 per cent. dividend, the rates must be reduced." If the company had done what was promised with regard to filter-beds and other works, it would have cost them £2500; and they would then have had to come to Parliament for more money. Provided that they had not done their work properly, the Corporation of Neath would have appeared against them, and Parliament would then have taken care not to grant a bill unless provisions were inserted in it for the purpose of enforcing upon the company the fulfilment of their duty. But what was the proposed course now? They desired to raise £190,000 under the provisions of the bill before the committee, of which £150,000 was share capital; and they might, or might not, carry out their undertaking. If they required an extension of time they would simply say that they had expended so much money in their work that it would be better for all parties that they should go on with it, and they would, no doubt, get their extension of time. The persons, or so-called company, who proposed the scheme, were simply two gentlemen, who thought that the undertaking and the laying out of £190,000 would return a very good profit; and, looking at it from a commercial point of view, had no care or consideration for the people of Neath. If the committee permitted the present bill to pass, that proper state of things, the control of the company to be exercised by Parliament, which Sir E. Beckett considered so desirable last year, could not be carried out, at least during the next generation. During that time the corporation would be left perfectly helpless to protect itself. There was another pointof some importance which should be referred to; Sir E. Beckett had said last year that the company would soon pay a 10 per cent. dividend, and then there would be a reduction of rates; 10 per cent. had been paid, and there ought to be a reduction of rates at once. What would be the position of things if the bill passed? £17,000 a year net profit at the very least must be earned by the company before there could be any diminution in the rates; whereas, if the committee were to leave things in their present condition, and refused to pass the preamble of the bill, the inhabitants of Neath would have the benefit of their rates being lowered this year. Was not that a very serious and a sufficient reason for opposing the bill, and a matter upon which he could appeal to the committee to render assistance to his clients? If the bill passed, the position of the Corporation of Neath would be such that for a generation, at least, they would not have the power to make the company do their duty if they chose to neglect it. Until something like £16,000 or £17,000 a year additional net profit was made by the promoters, there would be no diminution in the rates which the ratepayers of Neath were now entitled to. The moment that the bill passed, the people of Neath would be left entirely out in the cold, and would have no means of enforcing upon the company their liabilities. He should call witnesses to prove his case, which he knew would receive what it deserved—the careful attention of the committee.

At the conclusion of Mr. Somerset's speech,

Dr. *Letheby*, examined by Mr. WILL.

I am a professor of chemistry. I have had considerable experience in analyzing samples of water. In all, I have received five samples of water from the district of Aberavon. The first sample was marked, and it came from Gwen-Ffrwyd, at the entrance of the site of the proposed reservoir. The second sample was marked as coming from the Pelenna River. The third sample came from the colliery level. The fourth sample of water was stated to have come from above the colliery level. All the samples of water which I received were turbid, and yielded a quantity of sedimentary matter after having been left standing for some time. The result of my analyses of three of the samples was that they were very good water.

The CHAIRMAN: Was that all that you analyzed?

Witness: Yes, that was all, with the exception of the mine water.

By Mr. WILL: As to the other sample—that which was taken from the colliery level—that is very bad water. It is totally unfit for human consumption—it is not at all adapted for domestic purposes. When dissolved, it contains 85 grains of matter in the gallon, of which nearly 29 are sulphate of lime, 22½ are sulphate of magnesia, and over 30 grains are sulphate of iron. Three of the samples were very fair, but the fourth was not good for consumption in the state in which it was submitted to me. Looking to the degrees of softness of water, they were very good for domestic purposes. Their hardness was from three to five degrees—that is a comparatively soft water. There were four degrees in one sample. However, on the score of hardness no objection can be taken to the water. The matter which I found in the fourth sample which I received is that which would come from a colliery—sulphate of lime, magnesia, and iron, are what come from collieries.

Cross-examined by Sir E. BECKETT: All the samples are rather soft. One of them is taken from the level of the colliery. I have not seen your analyses.

By the CHAIRMAN: The first sample was taken from Gwen-Ffrwyd. Its hardness is 5·1, which after boiling for a quarter of an hour is reduced to 4·2. The primary hardness of the London water is 13½, and that water, after a quarter of an hour's boiling, is reduced to about 4 degrees. After an analysis of No. 1 sample, I found the following proportions of matter in it:—4·09 of sulphate of lime, 3·64 of sulphate of magnesia, ·98 of natural salt or chloride of sodium, ·49 of silica, and ·14 of organic matter, and there was rather less than half a grain of carbonate of lime—altogether there were 9·75 grains of matter in that sample. In No. 2 sample, taken from the Pelenna River at the entrance to the proposed reservoir, I found only a trace of carbonate of lime, 1·64 of sulphate of lime, 1·73 of sulphate of magnesia, 1·06 of chloride of sodium, ·40 of silica, and ·25 of organic matter, making altogether 5·08 grains. The sample No. 3, which is water taken from the level of the colliery, contained ·46 of carbonate of lime, 28·56 of sulphate of lime, 22·29 of sulphate of magnesia, 30·49 of sulphate of iron chiefly—there were other sulphates with it—1·18 of chloride of sodium, 1·72 of silica, and ·38 of organic matter, making a total of 85·08 of matter. In No. 4 sample—the water of the Pelenna River above the entrance of the colliery level—there was ·40 of carbonate of lime, 1·36 of sulphate of lime, 1·11 of sulphate of magnesia, 1·07 of chloride of sodium, ·62 of silica, and 1·45 of organic matter, making altogether 6·01. The hardness was 3 degrees, and after being boiled for a quarter of an hour, it was reduced to 1·6. Organic matter does not mean sewage. I did not see any trace of sewage in any one of the samples of water. The quantity of ammonia was rather large in the colliery water. There is in all waters a little ammonia to be found.

Mr. *James Kempthorne*, examined by Mr. SOMERSET.

I am a member of the Town Council of the borough of Neath, and have been for many years. I know the Act of 1865, and the section 4 which refers to the separate undertakings of Neath and Briton Ferry. I am also acquainted with the Act of 1861, which granted powers to the Neath undertaking. In 1865 the power given to the company was simply to enable them to raise additional money. In the year 1861 representations were made to the company by the corporation with respect to the necessity for constructing filter-beds. I represented the corporation on that occasion. The result was, however, that the corporation last year went to Parliament for a bill for a compulsory sale of the Neath undertaking to them. We obtained power by the original Act of 1861 to purchase by agreement the Neath undertaking. It is quite right to say that sanitary reasons were the principal reasons which induced us to apply for that Act. The Act was opposed by the Neath Water Company, and the parliamentary committee decided that the time had not yet come for the purchase of the undertaking by the corporation, that the water was objectionable, and that certain things should be done by the company to improve the then existing state of things. Mr. Hawksley, the consulting engineer, was the only gentleman who appeared as a witness against us, so far as I know. I recollect that he said that the company could carry out the works for the filtering-beds for £2500. I heard what he said yesterday as to the altered state of things since 1874, of which he was then aware. The manager of the company was in the room the whole of yesterday, and so also was the secretary. Neither of those gentlemen were called to give evidence as witnesses, and they, of course, would

have been the parties who would have instructed Mr. Hawksley as to facts last year. They attended before the committee last year. I have lived at Neath all my life, but I have never heard of the claim which Mr. Hawksley said had been made by the rector. If the secretary had appeared yesterday I know, as a solicitor, that he would have been able to give either a positive or a negative answer to the committee on that point—at least, as secretary of the company, he should have been able to give it. If a director had been called he might have answered the question. I have never heard of the claim. The cut which has been mentioned by Mr. Hawksley has existed for 30 years. I cannot see the difficulty which he has suggested. If such a claim as that stated existed, the company could have proved it. I have never heard of it. The question is simply as to who it was that told Mr. Hawksley of the claim. Since the bill was rejected by the committee last year, I have been in constant communication with the Neath Water Company on the question of the filter-beds. I do not think any replies to my communications have been sent by them. Nothing whatever has been done to carry out the work of filtering. There has not been a spade put in the ground. We have had constant complaints from the medical officers as to the quality of the water. No one can drink the water. It would be excellent if it were filtered. That is what our medical officers tell us. If the bill before the committee be passed, we shall be worse off than we now are. If it be not passed, the company must go to Parliament to obtain power to raise more money, and we shall then be able to appear against them. I am able to prove the report of the directors. They have paid a 10 per cent. dividend, and therefore we naturally complain that they have not done what they ought to have done for us. If they should come to Parliament for further powers, and they had not done their duty, very stringent clauses would then be enforced upon them, compelling them to do their duty. The select committee last year, before whom the bill was laid, after having heard what the Corporation of Neath had to say, spoke very plainly to the company, telling them that something ought to be done by them forthwith. Nothing, however, has been done, as yet, by the company. If the present bill, which enables the company to raise £190,000, should pass, we shall be deprived of the power to compel them to proceed with the work of the filter-beds; and we shall be left entirely to their mercy on that point. There is no power in the bill, like there is in railway bills, to enforce a penalty, and therefore they would be at perfect liberty to spend all, or a portion, or none of their capital, in the construction of these works. I do not suppose that they will do any more for Neath than that which they think will bring them in a very good pecuniary return. At least that is my opinion from what I know of some of the gentlemen. The corporation do not look with confidence for much assistance from them, unless they are able to secure a large percentage on their outlay. They may be satisfied with less than 10 per cent. Anything above a 10 per cent. dividend, I have always understood, was to have gone towards the reduction of rates; and therefore there ought to have been a diminution in the rates during the last year, because the directors of the company have announced that it is their intention to pay their shareholders 10 per cent., and there has been an increase of their business. If this bill passes the committee, there will have to be something like £17,000 of clear net profit made by the company before it is able to pay 10 per cent. It will have to be at least that amount. They have to pay £1050 a year in perpetuity to the old company; and there is £260 besides to be paid in respect of the Gnoll property. When I put the amount at £17,000, I put it fairly enough for a net profit. It will take some time before that is effected—at least, I should think so. We shall be left entirely at the mercy of those gentlemen. I do not think there would then be much likelihood of a reduction of the rates at Neath. We were looking forward to the moment of their getting their 10 per cent. dividend, so that we might get our rates reduced. Now it seems as if we shall be cut off altogether from that reduction. We certainly ask the committee to reject the bill before them. Something was said yesterday about a speech made by me with respect to this bill. I have previously said that the corporation did not wish at an earlier stage of the proceedings to throw out the bill; but the Corporation of Neath had to get the sanction of the ratepayers to the opposing of the bill before we appeared here. The figure asked by the company was far in excess of what our corporation are prepared to give. My duty is to look to the wants and desires of the people of Neath alone.

Cross-examined by Mr. MICHAEL: It was at an early period of the proceedings in the present scheme that the meeting was held to which I just alluded. The Town Council of Neath had passed a resolution to oppose the bill. I presided at that meeting as mayor, as I always do when I am at home. The resolution which was passed was that the preamble of the bill should be opposed. I should have been very glad indeed not to have opposed the bill, provided we could have acquired the property for the corporation. I was not aware that the corporation had the power to set up water-works of their own if the existing water-works did not meet the requirements of the district which they were intended to supply. What we want is a good and sufficient supply of pure and wholesome water, and we are desirous of acquiring the property for ourselves, because we cannot place any trust in the water company. I am not aware of any single instance of powers being granted to a corporation to acquire a water company. The supply of water ought certainly to be in the hands of local authorities. It is the duty of the company to supply wholesome water, but I was not aware that we could enforce that duty upon them. It would not answer our purpose at once to construct filter-beds. The present supply of water by the company is insufficient—at least, in point of quality. The supply, of course, cannot be improved without an expenditure of capital. Nothing has been done with regard to the construction of filter-beds. We require for the district of Neath an increase in the supply of water. Last year we had an insufficient supply. It is necessary that money must be expended to increase the storeage accommodation, and in the improvement necessary for the filtration of the water. The 10 per cent. dividend now declared would be reduced if such an expenditure were incurred by the company. They have no right to divide that 10 per cent. without carrying out the improvements required by the corporation, and which has been promised to it. An increased supply of water is not required just at the present time. Last year we made complaints as to the insufficient supply. As they go on increasing their reservoirs they will be able to obtain a larger supply of water; and, as the population increases, and they require a greater quantity of water, the dividends of the company will increase, after having expended money to carry out their improvements. If the bill before the committee is not passed, the moment the company are able to pay a 10 per cent. dividend we shall get the advantage of it. If they lay out money in increasing reservoirs, it will be far in advance of what is really required. I am not aware that a notice was served for an action upon the Neath Water Company with respect to a claim to the Dufferin water. The first I heard of that matter was yesterday, when Mr. Hawksley, in his evidence, referred to it. Such a claim could not exist without my knowing it.

By Mr. SOMERSET: Mr. White, the gentleman who could have proved the claim which was said to exist, is present in the room. What Mr. Hawksley stated last year before the parliamentary committee, and corroborated yesterday, subject to the exception of the claim he had since heard of, was that everything required for the Corporation of Neath could be carried out for the sum of £2500. That would meet the requirements of the 11,000 people of Neath. The reason that the bill should not pass is, because the corporation desire to be exempted from its operation. Mr. White was present at the meeting over which I presided as Mayor of Neath. It was stated that we should not oppose the scheme unless the corporation and the ratepayers expressed themselves against the bill. Mr. White has made certain statements with respect to what has been done, which are certainly mistakes. Last year, before the committee of the House considering the bill, it was proved conclusively that filter-beds were necessary to improve the quality of water supplied to the inhabitants, and it was then said by the company that something would be done by them in accordance with the suggestions of the committee. However, nothing has been done from that time to the present. Yesterday Mr. Hawksley said that filter-beds were to be put down. The time has now arrived when the rates of the town ought to be reduced, as was promised should be done. We do not want this company to leave us out in the cold for the next 25 years.

By the COMMITTEE: Do I understand you that you expect there should be a reduction of the rates before the necessary improvements are carried out by the company?

Witness: What the corporation require is that the rates of the place should be reduced before the 10 per cent. dividend is paid.

THURSDAY, MARCH 18.

Mr. *Alfred Curtis*, examined by Mr. THOMAS.

I am the town-clerk of the borough of Neath, and have been so for the last five years. Prior to the establishment of the Neath Water Company, the inhabitants of Neath obtained their supply of water from pumps and wells, many of them belonging to the corporation, with the exception of what they got from brooks and watercourses running through the town. After the Act of 1861 was passed, and the water-works were constructed, the corporation allowed the pumps and wells under their jurisdiction to fall out of repair, and they were disused. The practical effect of this was that the town became solely dependent upon the water-works of the old company. In 1866 there was an outbreak of cholera, and as many persons died, it caused considerable alarm. The question of the water supply then came before the council as a matter of urgent moment. There were medical men on the board, and they, with others, strongly recommended the disuse of pumps; and an application was addressed to the council by the water-works company, suggesting as the council had power to take over the company that that power should be exercised. Notices to that effect were issued to the owners of a great number of houses—as many as 150 notices were issued, and that number covered five times as many houses—asking if they were desirous of taking over the water company. The only result of that was that the dividends of the water company began to rise, and having paid 4 per cent. before that time, they gradually rose until they reached 7½ per cent. Representations were subsequently made to the council that the water supplied by the company was not pure, and the council caused analyses of the water to be made. Previous analyses had satisfied them that the water was pure and wholesome; but the analyses of 1868—the time when the attention of the council was directed to the bad condition of the water—showed that the condition arose from a want of a sufficient storeage; and I was instructed to send a memorial to the water company on the subject. It was signed by the mayor, and sent to the company. The receipt of the document was not even acknowledged. Means were not taken by the company to increase the storeage, or to lay down filter-beds. Very little was done in the way of increasing storeage—nothing adequate to the requirements of the town. As regards the quantity of water during several recent summers, in 1868, 1869, and 1874, the town was put on short allowance. The water supplied was also of a turbid character. In 1873 the corporation, finding that the water company did not do what was necessary, endeavoured to negotiate for the purchase of the water-works, in order that they might ensure a good supply of pure water. We were advised that an outlay of £2000 or £3000 would do all that was necessary for an increased storeage, and for providing filter-beds. Communications passed between the corporation and the water company with reference to this matter; and I took the opportunity of looking at the title of the company to ascertain whether it was such as I could recommend to be taken by the town. We found that they had a right to the water of the Gnoll estate, at the point alluded to by Mr. Hawksley. That stream is at a point in a walk that goes along a diverted stream, which is commonly resorted to by the Neath people. It has been known to me for nearly 40 years. Since 1861 the company have had the entire regulation of the diversion of that stream, I should think; at all events, I have seen their men very frequently at work there. With regard to the claim mentioned by Mr. Hawksley, if any proceedings respecting it had been taken I should have heard of it. Taking all the circumstances into consideration, I advised the corporation to buy the water-works. When we were coming to Parliament with a bill to purchase the gas-works, we gave notice of our intention to purchase the water-works, and introduced into that bill a clause giving power to buy the water-works. We put compulsory powers in our bill, and it was brought before Parliament. The result was that the bill was thrown out, after evidence had been given by Mr. Hawksley on behalf of the company, stating that such improvements as would be considered satisfactory, as to filter-beds and other improvements, would be carried out. The impression at the time was that the promised works would be carried out at once. Nothing has been done by the company in the way of filtering water since that time. In the meantime, during the last summer, we have had an unusually dry season, and the town has suffered from insufficient storeage, and from non-filtration of the water. The complaints of 1868 and 1869 were repeated again last year. There are three ponds at different elevations, and pond *c* is about half way down the town. The filter-beds now proposed would be for the purpose of filtering the ponds *a* and *b* only. Pond *c* would not require to be filtered, as its water would be used for flushing sewers and for other street purposes, for which filtration would not be necessary. Taking the two wants of Neath—increased storeage and filter-beds—the effect of the bill passing in its present form would be, I consider, that we shall be postponed for an indefinite period from having the requirements, which could be carried out at a small cost. We shall have no power whatever if this bill passes. I think, practically, we shall be at the mercy of the company. And if we found the state of things intolerable, and brought in a bill to attempt to remedy them, the answer would be that Parliament had given them seven years to complete their works, and our bill would be defeated on the ground that Parliament had committed the matter to other persons. Supposing that they should change their view—that while the money market looks well, and the gentlemen think it will be a good speculation—supposing that things should change, and that they should not wish to go on with their work, there is nothing to compel them to do so. I cannot bring my mind to believe that, if the bill is sanctioned, the scheme will go on. Supposing that it did not go on, and the promoters did nothing, they would hold their powers for seven years; we should be held in a vice, as it were, for that time, whether the works were carried out or not. The effect would be that, so long as these powers existed, I should not be able to advise the corporation that there would be any possibility of their succeeding in any action in Parliament against the company. If they did not carry out the works for five years, and came to Parliament with the view of obtaining an extension of time, they might obtain more than seven years, for Parliament is in the habit of granting an extension of time. I considered it absolutely essential, both with regard to the water supply and in the interest of the town, that upon the present bill there should be a settlement as to what course should be pursued. I think that we, at Neath, should be left out of the present scheme altogether. There are abundant powers given by the Acts of 1861 and 1865 to the present company, if they think fit to exercise them, and they ought to have exercised them long ago. They have obtained their maximum dividend, but they have not given us the benefit of a pure water supply, which last year they could have done at a very small expense. If the scheme before the committee is passed,

there is not much prospect of its being carried out. With reference to the probabilities of the present scheme being carried out, I consider that it would depend very much upon the probable revenue—whether it satisfied the promoters when they came to look into affairs more closely. Looking at the matter in that light, it is of great importance to the town to ascertain whether, if the bill passes, there is much likelihood of the works being effected. I have heard the statements with respect to the number of people to be supplied with water. The financial success is to rest upon the water being taken by a population of 44,000. There should be some corrections made in the estimate of the population. Aberavon was stated to have a population numbering 9000; but its population really is only 3500. I understood the estimate to include two other places, but including those two places, the number would not be more than 6000. The figures which I have given are taken from the last census, with such an addition as may be fairly considered to have taken place since the census was taken. According to the last census, Aberavon contained a population of 3396. Taibach is not given separately, but the number there cannot be over 2000. I have given 500 as the population of Baglan. Aberavon, including both Baglan and Margam, should have been as I have stated, instead of 9000. The number at Cwmavon does not exceed 5000, and it is stated to be 7000. The whole of the population of the parish, including the upper and lower hamlets, was only 5920 at the last census, of which number there must be considerably over 1000 in the upper hamlet, and the scattered portions not within Cwmavon. The population of Neath is put at 11,000—that number may be very near the mark. Cadoxton, I was surprised to hear, was stated to contain 3000 people. It is but a village. The whole of the population of the hamlet is 1900, and that embraces some six or eight villages besides Cadoxton. Cadoxton itself is near to the town of Neath, and extends about 14 miles in one direction, and 67 in the other. The next place that was mentioned was Skewen. That is in the parish of Cadoxton, and alone would be about 500. The population of Neath Abbey and Skewen together would be 2500. I have taken several hamlets together, omitting the distant portions of the hamlet which are not within the district. Llansamlet population would be about 1000. The census return refers to Llansamlet parish, which is a large parish extending far beyond the bounds proposed to be supplied by the water company. The number of people living in the village of Llansamlet cannot exceed 1000. Then, again, Briton Ferry was stated to contain 9000 persons, whereas I should be surprised to find more than 5000 there. The census gave it as 4800 for the whole of the parish. Baglan has a very rural population. That is the whole number of persons to be provided for, and it will be found that the total is 30,800, instead 44,000. Even in that estimate I have included the population of some rural districts which would never really be likely to pay the necessary expense of being provided with a water supply. A considerable portion of the parishes named would be out of the reach of a water supply, and many others would have supplies of their own. Whether my calculation or that of the promoters is the correct one, Neath and Briton Ferry have, together, one-half of the population to be supplied, and the net revenue derived from those places has not yet attained £1000. The revenue derived from the water, which is actually supplied to both those places for some years past from an inexpensive source, has not exceeded £1000; so that I really cannot understand how even one-third of the proposed outlay for the present scheme can be justified. I think the estimate for the works is £125,000. In order to be able to pay 5 per cent., there would have to be a revenue five times as great as that which the present company gets from one-half the number of people they now contemplate supplying. Although my estimate differs from that of the promoters, in both of them you will find that if you add the population of Neath to that of Briton Ferry, it amounts to half of the whole number which the company propose to supply. So far as Neath is concerned, we have this further to say, that whatever may be the case with the other populations, we have water with respect to which no complaint has been made, except that it is not quite clear. We shall be forced to go to a district where the water will be more and more contaminated by the collieries. The district is being opened up daily by collieries, and the water must necessarily become more and more contaminated by those openings; and we object to being sent from a pure source of supply to one that is, or at all events would be likely to be, much worse. The inference which I draw from my calculations is, that if the promoters of the scheme get their bill passed, and then go into the matter more accurately, it will not afford a basis for them upon which to raise money in London. They will get an Act of Parliament, and nothing more; but that will tie the hands of the whole of the sanitary authorities in such a manner that we shall be obliged to come to this company and ask them to let us have the power and the privilege of supplying our constituents with water. They will merely have to sit still, and we shall have to pay any price in order to get what we require. With respect to the question of the rates, the Neath and the Briton Ferry undertakings are separate, and whilst the former pays no dividend, the latter pays 10 per cent. The fourth section of the Act of 1865 states that the incorporated Acts are to have separate application to each of those undertakings. The effect of that separate application is that having arrived at a 10 per cent. dividend, there should then commence the application of the revenue to a diminution of the water-rates. Therefore, the company having obtained their undertaking on that basis, they now, by the passing of another bill, will practically obtain relief from the enforcement of that stipulation, and then we shall have no reduction in the rates until the whole of their new capital shall have paid a 10 per cent. dividend. It will practically have the effect of repealing the water-works clauses so far as the town of Neath is concerned. We have been now for about 14 years paying existing rates in Neath, and we—that is the corporation—think that by the action they took they set the company in a fair way to the obtaining of their high per centage, in having done their best to persuade the population to take their water; and if the company had acted in good faith, and increased the storeage accommodation, and provided filter-beds, we should have used our efforts to induce all the householders to take the company's water. We consider the company, now that they have reached their maximum, and are paying a 10 per cent. dividend, should make a small outlay to carry out the promised improvements, instead of expending so much as to necessitate the postponement of the reduction of rates for at least a generation to come.

Cross-examined by Mr. MICHAEL: The town of Neath is increasing. The population is not going up very rapidly. There are not any works springing up there or in the immediate neighbourhood of the town. The populations will be gathered above the site of the proposed reservoir. There are a number of huts which have been erected temporarily, and which, I understand, are to be replaced by cottages. There are a number at Aberdare and at other places. Cadoxton is not increasing as regards population, and Skewen but slightly, if at all. Generally speaking, at Neath there has not been any perceptible increase for some considerable time. The burgess list of last year was less than that of the year before. From the year 1861 to 1871 the increase amounted to something like 2000; but then it must be remembered that there were some tin-works started during that time. A great increase in the population of Neath took place between the years 1863 and 1865. The commissioners were going to expend £200,000 in some works for the improvement of the river. That expenditure was intended to have been made with the view of accommodating the trade in Aberdare. The Town Council of Aberdare last year opposed the bill brought forward to obtain the sanction of Parliament for that expenditure. There has been a great difficulty in obtaining the necessary funds, and I very much doubt whether they have obtained them. The water which is now obtained by the Water-Works Company for the supply of Neath was offered for sale to the corporation. It was offered for £100 a year; but the inhabitants of the town refused to authorize the taking of the supply by the corporation. The Town Council were very desirous of obtaining that water supply in their own hands. There were two meetings held in the town with reference to the matter. A morning meeting was held, at which the intelligent portion of the inhabitants was present, and they upheld the views of the corporation; but a counter meeting was held later in the evening, and the decision of that meeting tied the hands of the corporation, and would not permit of the acceptance of the offer of the water company to hand over their supply for £100 a year. I have heard that the shares of the water company were offered to the inhabitants of Neath, and that they would not take them. I mean to say that, comparatively speaking, for a very small expenditure, the whole of the necessary works could be carried out. I do not suppose that the company, if they incurred such expense, would be able to pay a 10 per cent. dividend for some little time; but the effect of such expenditure would be that their revenue would be so increased that they would soon be able to pay 10 per cent. again. The immediate effect would be to reduce their dividend to about 6 per cent. We believe that an expenditure of £5000 would be sufficient to enable the Neath reservoirs to provide a supply to Neath, Briton Ferry, and Skewen of wholesome and pure water, and an abundant quantity of it. The revenue of the water company would be thereby so increased as to allow of the payment of a 10 per cent. dividend, if not of a higher rate. If the Town Council could obtain increased storeage accommodation, filter-beds, and a diminution of their rates, they would be quite satisfied. The water is not a bad water, except when it is in a turbid condition. If the bill now before the committee passes, we may be kept without filter-beds and a wholesome supply of water for as much as seven years. The Corporation of Neath have repeatedly remonstrated with the water-works company with respect to the condition of the water. We have frequently given this company notice to provide us with good water, but they have failed to do so. With the promises which were given to us last year, we thought the company would have proceeded to carry out their pledges, and have provided us with increased storeage and filter-beds. They have, however, done nothing in that respect. They certainly are cleaning out one of the ponds. I do not think they have done anything whatever during the last season to the upper ponds. We called upon the water company in the year 1868 to lay down some filter-beds. I gave evidence before the parliamentary committee in April of last year. The burgess list for the last year is less than that for the preceding year, and that is a pretty good guarantee of the population. So far as the population in the tables of the census are concerned, the estimate of the promotors is excessive. Skewen was put at 3722; but the Skewen included in the census is an ecclesiastical district extending far beyond the district to be supplied. The persons living in that district are not at all likely to get any water. The ecclesiastical district extends down to the sea on one side, and on the other side far away into the agricultural portion of the parish, some distance out of the village. The parish of Cadoxton embraces nine hamlets, and if the whole of the population of those hamlets are added together, it will be found that they number 8778. Of those hamlets, two are comprised in the Skewen district. Skewen is included in the Cadoxton parish for the purpose of estimating the population. Llansamlet, which is a sub-district, contains 6128 inhabitants. That estimate includes Llansamlet Higher and Llansamlet Lower. The latter extends right down to Swansea. The number of the population gathered together around Llansamlet Church does not exceed 1000. Llansamlet extends as far as the river. Cwmavon is not increasing in population. It is in the parish of Michaelstone. The total of the parish, including the higher and lower hamlets, is 5920; but Michaelstone Lower has as many as 5300 inhabitants. Aberavon is not increasing in its population, which is given at 3396. There has been some increase in the numbers at Briton Ferry. There was a transfer of the Briton Ferry Docks to the Great Western Railway Company.

Re-examined by Mr. THOMAS: If there be a water company within the district, we are not allowed to supply for sanitary purposes at a charge of more than 2d. per week, if the company is able and willing to lay on a proper and sufficient water supply. The profit of getting and supplying water at 2d. per week is not likely to be very great. We should be obliged to acquire land and construct reservoirs. Two water companies would not pay in a small place like ours. One company will pay very well if they do their duty properly. We should be a great deal better satisfied if the company carried out the parliamentary obligations under which they have been placed; and we consider that they ought to carry them out before any further powers are either sought by, or given to, them. I do not think it a practical suggestion that we should set up water-works for non-paying purposes, whilst the whole of the paying customers would go to the existing company. We should be obstructed at every point by the present company.

By the COMMITTEE: The population is entirely gathered together at the base of the hills from which the waters are collected. The Neath water is fair, but it is not collected in any reservoir. It is fit for use. We at Neath are satisfied that the water collected in the ponds is the purest that can be collected in the neighbourhood, and the only really necessary thing is to make a small outlay for increased storeage accommodation, and to provide beds for filtering the water. I think that the water of the Neath River is very good; but there is no doubt that it is subject to pollution being allowed to run into it. It is considered a very pure stream. Fish abound in the river Neath, and there is very good salmon, trout, and other fish to be obtained. There are colliery workings springing up in various parts of the valley.

By Mr. MICHAEL: Practically speaking, Skewen has risen in importance since the Ordnance map was made out.

Mr. *George Wilson Stevenson*, examined by Mr. SOMERSET.

I have had, as an engineer, considerable experience in the management of water-works. I have known the town of Neath for many years, and also the adjoining district; and, for the purpose of the present inquiry, have made a special visit to the place. The water of the Neath River is not at all suitable as a supply for domestic purposes. At Neath the river is tidal, but higher up the valley it receives the sewage of a considerable district. I have considered the scheme of the promoters with reference to its effect upon Neath. With regard to the drainage area, Neath is provided with its own area. There is an abundant drainage area, some 700 to 800 acres draining into the present reservoirs. There is also a drainage area in addition to that, which can be utilized for the supply of Neath, which extends over another 400 acres. But the present drainage area which is now utilized is amply sufficient for the supply of the town of Neath for many years to come. It has its own supply from water-works. It is now supplied by gravitation from two reservoirs. One reservoir, called reservoir *c*, is at present out of use; it is being cleaned out. The three reservoirs will contain about 18 million gallons of water, a sufficient quantity to supply a population of from 10,000 to 11,000 people with 20 gallons per head per day for nearly three months. That is the case supposing that there is no water flowing into the reservoirs from the streams, which is not very likely. There is always water flowing in from the streams to the reservoirs. Those reservoirs, which are called *a* and *b*, will contain about 17½ million gallons. Reservoir *c*, the one at present not in use, will hold about 420,000 gallons. The supply for the town of Neath is taken from the intermediate reservoir—reservoir *b*—so that close upon 18 million gallons are available for the supply of the town.

Cross-examined by Mr. MICHAEL: The dimensions of reservoir *c* are 1 acre, 3 roods, and 19 perches, with an average depth of 5 feet 2 inches.

Re-examined by Mr. SOMERSET: The pipe for the supply of Neath is taken from the intermediate reservoir *b*, and from reservoir *b*. The top and intermediate reservoirs contain altogether 17¾ million gallons. My attention has been called to the evidence given before the committee of the House last year by Mr. Hawksley, as to the sufficiency of the sum of £2500 for improving the

Neath supply. I understood that amount to be made up of £1600 for filter-beds, and an improvement of reservoir *c*; £400 for the improvement of the pipeage throughout the town; and the remainder—£500—for the reservoir of Briton Ferry. The £2500 was intended for Neath and Briton Ferry. That sum includes everything, including the pipes to Briton Ferry and the improvement upon the *c* reservoir. £2500 is the amount required, according to Mr. Hawksley's estimate, and I quite agree with him. The drainage area is ample, the reservoir-room is quite sufficient, and all that is required is an improvement of the bottom of the reservoir, which I should appropriate for supplying the railway company, and the filter-beds. As the plan stands, it is the most compact, simple, and appropriate work that could be devised for the town of Neath, and as soon as £2500 are expended in the proposed improvements of the reservoir, Neath will be provided with a perfect supply of water. I say that, for the purposes of the scheme, the expenditure is necessary. At present, the expended capital at Neath is £10,050, and the £2500 required to be expended will thus make £12,550. The present net profit is £1060 a year, and that is 10 per cent. upon the present expended capital. If £2500 additional were expended, it would reduce the dividend to 8 per cent. instead of 10 per cent.; but as the limit of supply and demand has not yet been reached—as all the houses in the town of Neath have not been supplied—I do not think there would be any diminution of the dividend to the shareholders. There might, however, be a slight reduction in the rate of dividend for one year. Having the water-works so suitable for all purposes, giving a practically good water after filtration, of course, having such water-works by a moderate expenditure, it would be absurd to go to a distance of eight or nine miles from the Pelenna valley either side of the mountain to bring a supply of water to Neath, at a cost of not less than £48,000.

Cross-examined by Mr. MICHAEL: I did not work out those figures myself. The supply for the railway company is to be taken from the reservoir *c*. The town of Neath cannot get their supply of water until after the railway company have obtained theirs. The railway company have the power of taking what water they require from their 5-inch main-pipes.

Re-examined by Mr. SOMERSET: In my opinion the scheme before the committee, if carried out, so far as the town of Neath is concerned, will inflict a great hardship.

By the CHAIRMAN: The pipe from the town of Neath is let into reservoirs *a* and *b*. Water from those reservoirs can be let into reservoir *c*. That reservoir is not sufficiently large for the town supply. There is a very large acreage—400 acres—to supply that reservoir.

By the COMMITTEE: There is always water flowing from the streams into the reservoirs. But the water is frequently intercepted in its course.

Mr. MICHAEL then addressed the committee for the promoters. He said that, with the exception of Aberavon and Neath, the whole of the sanitary authorities of the district were in favour of the bill before the committee. Those authorities had expressed their anxiety that the proposed scheme should be carried out in order to supply a want that was greatly felt. There was a very large population who were entirely dependent for their water upon chance supplies which were to be obtained from the hill-side streams. The mountains in that district were so honeycombed by mines, that the streams were subjected to such pollution that the water obtained from them was entirely unfit for use for domestic purposes. The influence of such pollution was that in Taibach it was found that as many as 90 to 100 cases of typhoid fever existed at one time. Beginning at the top of the stream of water, there was Cwmavon, with an immense mining population, who required to be supplied with water, as they were in a totally destitute condition in that respect. Coming then to Aberavon, it was found that there the people were also destitute of a proper supply. Lower down there was Taibach and other places, which were entirely unsupplied with water, and so also was Briton Ferry, which was a large and increasing district. Whatever outlay was made to meet those urgent requirements would be made out of the pockets of the shareholders of the undertaking brought forward by the promoters, and it would in no way affect any existing interest whatever—at least, no pecuniary interest—of any of the various parties who were proposed to be served by the bill. There were also Cadoxton, Skewen, and Llansamlet without an adequate water supply. The only place where there was any allegation by the petitioners that there was a water supply was at the town of Neath itself. With reference to the question as to how the scheme now being considered had originated, he might say that the Corporation of Neath were desirous of acquiring the water-works of Neath themselves, but a committee of the House of Lords had refused to accede to the request of the Neath Corporation; and it was with a view of carrying out the recommendations of that committee that the present scheme originated. It was only on account of the necessities of the case, and because Mr. Hawksley had seen that it was necessary to have a larger scheme, that he had been obliged to neglect the water-works for a time, in order to go to another district to obtain water. It was quite true that the promoters were going out of the district; but it was not true to say that no water-works company could go out of their own district if they desired to get an improved water supply. Many companies had been obliged to go out of their own watershed area to obtain a supply of water. The most that had been said against the companies in those cases was that there should be in some future legislation a limitation to the effect that, before one district invaded another, the district which was invaded should be adequately provided with water itself. It was an essential part of the scheme which he (Mr. Michael) was advocating, that the whole of the watershed area should be supplied with its own water. Alluding to the position taken by the two petitioners, he said that there was no district in England where more important works had been established than in the area of the South Wales coal district, where there were tin, iron, and copper mines, and other extensive works. Large sums of money were being expended to increase the means of communication, which showed how important a district was the one which the promoters were desirous of supplying. In that district, in the future, there was likely to be a large augmentation of the population, who would urgently require to be supplied with water. At Cwmavon and at Aberavon there were populations requiring to be supplied. It was said that at Neath the corporation intended to supply the inhabitants with water, but that had been their intention for the last eight years. But, in truth, the corporation property had nothing to do with them in their character as an urban sanitary authority. With respect to Aberavon, what had happened was that as a corporation they had had impressed upon them for the last eight years the necessity of a water supply. In 1867 they had caused a number of persons to construct water-closets, but since that date the corporation had done nothing but promise, and had really done nothing towards supplying water. It was a very foolish proposition to put before the committee, as had been done by the petitioners, when they stated that the promoters were going to take away a source of revenue from the town authorities. It was necessary to go through Aberavon in order to carry the supply to Taibach, and even if Aberavon was to be cut off, pipes would have to be laid through that town for the purpose of carrying the supply to the district farther on; and it was impressed upon the committee by the petitioners that Aberavon should be cut out, and that the pipes, although going through the town, should not be utilized. The petition called attention to the quality of water which the promoters intended to supply; but it was only said that the petitioners could supply as good water as was proposed by the scheme; not that that water was of a bad quality; in fact, it was thereby actually admitted that it was good. The water, according to the analyses of some of the most eminent medical authorities—Dr. Voelcker and Dr. Letheby—was as good a water as could be obtained for the purpose of drinking. The saline ingredients which were found in it were those which acted as precipitants, and rendered water better than it otherwise would be. Iron in water, when held in suspension, acted as a filter. The analyses showed that the water to be supplied by the promoters was free from impurities. Mr. Michael did not see how Aberavon could be injured by the carrying out of the scheme. The corporation itself would themselves have to expend a large sum of money to obtain a proper supply of water, if the bill before the committee was not passed. For some eight years the corporation had not seemed to have been in the humour to obtain such a proper supply; they had now no definite scheme, and water taken from the sides of the mountain was continually liable to contamination. The Aberavon Corporation had made up no case whatever, except that, if the present scheme of the promoters were carried out, the inhabitants would be greatly benefited. He failed to see what grounds they had for their petition, or how they had supported the allegations which they had made against the purity of the water to be supplied by his clients, or against the necessity of such supply. With respect to health, it was quite true that the town had got a supply of water, but for some years that supply had been totally inadequate to the requirements of the place. The Corporation of Neath had been offered the water supply of the Neath Company for the sum of £100 a year, but the offer had been refused. Complaints were afterwards made by Neath that the company's supply was neither good nor sufficient, and it was to remedy that complaint that the promoters came before the committee with a new and a better scheme. As to the quantity and quality of water to be supplied to the town of Neath, the promoters would be under an obligation to give a proper supply. Mr. Michael concluded that he thought he had made out a case of public necessity, which would be met by the scheme of the promoters, and that Neath would in no way be damaged by a better supply of water being brought to the town; and he, therefore, trusted that the committee would pass the preamble of the bill.

The room having been cleared for a short time,

The CHAIRMAN said: The committee have come to the conclusion that the preamble is not proved.

THURSDAY, APRIL 8.

(*Before Mr.* BAILLIE-COCHRANE, *Chairman; Mr.* WELLS, *Mr.* YEAMAN, *and Mr.* DICKSON.)

WEARDALE AND SHILDON WATER BILL.

Mr. MUNDELL, Q.C., and Mr. BIDDER, Q.C., appeared for the promoters; Mr. PEMBER, Q.C., and Mr. WHITE, appeared for Mr. H. E. Surtees, Mr. J. F. Elliott, Mr. G. A. L. Blenkinsopp, and the Highway Board, who opposed the bill.

Mr. MUNDELL said the bill was for extending the limits within which the Weardale and Shildon District Water-Works Company may supply water, and for empowering them to construct additional works and to raise additional capital, and for other purposes. The limits within which the company desired to supply water, in addition to the places already supplied, were—Lanchester, Esh, Burnhope and Hamsteels, St. Oswald, Crossgate, Broom, Elvet, Sunderland Bridge, Kelloe, Coxhoe, Quarrington, Cassop, Bishop Middleham, Thrislington, Mainsforth, Cornforth, and Cockfield. Notwithstanding the powers granted to the company in 1866, there had been such a rise in prices since that year, that they had not been able to complete the works which were then commenced; the Tunstall reservoir was not completed, nor the piping of the district. The result was that their capital was exhausted, with the exception of a few thousands, and they were stopped in their undertaking, although the district still languished for water. The quantity of water which the company was at present able to supply was 2,500,000 gallons a day, besides 1,250,000 gallons a day for compensation purposes. The amount required was very much more than this, as would be seen by the rapid increase that had taken place in the population. In 1860 it numbered 38,000, but at the present time there were 126,000 inhabitants. In addition, it was sought by the bill to supply other places where the want of water had for some time been very severely felt. To give the required supply to this greatly increased and increasing population, spreading as it did over so large an area, the following works would be required, all of which were shown upon the plan:—The Houseslip, Tunstall and Bishopoak reservoirs at Wolsingham; the Redford and Bedburn reservoirs at South Bedburn, the Linburn reservoir at Hamsterley, the Mount Pleasant service reservoir at Brancepeth, the North Beechburn service reservoir at St. Andrew Auckland, the Ferryhill service reservoir at Merrington, the Toft Hill service reservoir at St. Helen Auckland, the Stockley Fell service reservoir at Brancepeth, beside all catch-waters and pipes needed to carry the water of these reservoirs to the various places throughout the districts. With these works they would be able to give an additional supply of 8 million gallons a day, or a daily supply of 10,500,000 gallons, and, being ready to apply the same principle as to compensation as was applied under the old bill, they would have to give 5,250,000 gallons of compensation water. This seemed a large supply, but it was absolutely required to meet the wants of the district, which abounded in large collieries and iron-works. One colliery employed from 3000 to 4000 hands, and required 157 million gallons a year for their works alone, or 250,000 gallons a day. The company, under these circumstances, felt that, in asking to be allowed to construct their extensive works, they were only asking for that which was absolutely necessary properly to supply the district with water. They proposed to take seven years for the purchase of lands, and 15 years for the erection of their works. The amount required was £600,000, with the usual borrowing powers. As to the compensation water, it would not be given all at once, of course, but as the various reservoirs were completed; all water that might be abstracted in the course of erection would be amply repaid. Mr. Elliott, one of the petitioners against the bill, had a mill between the Redford and Bedburn reservoirs, and he feared that the construction of these works would stop his mill altogether; but, if that should happen, he was fully provided for by the 12th clause of the bill, which bound the company not only to supply compensation water, but to give a sum of money should the nature of the case require it. As to the petitions which had been lodged against the bill, he might say that, with the exception of a very small portion of the district, it was an unopposed bill. No doubt the petitions against that part of the bill were deserving of every attention. Mr. Surtees, one of the petitioners, was the owner of the entire land upon which the Redford and Linburn reservoirs were proposed to be placed. His mansion was there, and he had a very beautiful estate surrounding it. Evidence would, however, be brought to show that the beauty would not be impaired. Instead of looking out upon a dale, as at present, he would look out upon a very beautiful sheet of water. As to certain farmhouses which would have to be removed, they would be placed in a better situation than at present, and money would be liberally given to compensate for any injury that might be sustained. It was said by Mr. Surtees that two brooks upon the estate would be interfered with, but the company were quite willing to agree not to interfere with those beyond a certain sufficient point without the consent of that gentleman. There were no mills in that locality, and the other brooks that would be interfered with by the proposed scheme were scarcely worth considering. Mr. Surtees objected to seven years purchase, and, as to the upper reservoir, no doubt some arrangement could be made to suit his views. With regard to the 15 years for the erection of the works, it was quite a reasonable time, as the company could not be expected to lay out money until they saw a fair chance of having it returned. It had been said that there was no adequate provision made for compelling the company to fulfil their obligations, but they had done all they could up to the present time, and had expended all their capital. That was the reason why there were districts which yet required pipes to be laid down in them. As to the injury to private

property, there would not be any. The largest of the proposed reservoirs would be a great boon to Mr. Surtees; and as to the laying of pipes, it was what was necessarily done in every district in England. The petition of Messrs. Elliott and Blenkinsopp sang the same tune. Mr. Elliott owned an estate in the parish of Hamsterley, and Mr. Blenkinsopp also owned an estate in the same parish, both of which estates, it was alleged, would be injured by the construction of the proposed works. Mr. Elliott owned a mill at Bedburn Brook, and Mr. Blenkinsopp owned one which was situated on a small tributary of the Bedburn Brook. The first was an old mill, once used as a cotton-mill, but not so used now. The other was a small corn-mill. It was said that these mills would be injured by the new works. If they were, ample money compensation would be given; the same would also be done for injury that those gentlemen might sustain on any other portions of their estates. The last petition was that of the Highway Board, who objected to the 15th clause, allowing 15 years to the company for the completion of the works. But the district would only be taken up as the circumstances of the case required. They alleged that the laying down of the pipes and mains would put them to a great deal of trouble and inconvenience, not only during the 15 years, but also during the existence of the works; that the Water-Works Clauses Act was not sufficient to protect them, and that if the bill should be passed there ought to be clauses specially protecting them. But the general law amply provided for their case. They said that the company had not used due diligence in repairing roads which had been broken up. Under the general law there were stringent provisions for exacting penalties, and yet no penalty had been exacted for any such neglect, which fact quite answered that allegation. It was said that a certain bridle road would be stopped; on that the committee would hear evidence.

Mr. *Thomas Douglas*, examined by Mr. BIDDER.

I am a mining engineer, carrying on business in the county of Durham. I have intimate knowledge of the county generally, and of the districts supplied by the Weardale and Shildon Water-Works Company. I know both the present district and the proposed addition. Since 1855 I have acted as the mining engineer of Messrs. Joseph Pease and Company. They hold very large royalties in the neighbourhood of Crook, Brandon, Billyrow Willington, and many other parts of the district. The population is very rapidly increasing all over the district. Since the Act of 1866 it has been far beyond what was anticipated, being 50 per cent. in the last four years. All the population is of a mining character. Several new collieries have been opened lately, and two are being opened at the present time. Water is lost by draining away into the coal workings. In consequence of that the trade has suffered very severely. Within the last year or two we have in certain parts of the district got our supply from the Weardale Company. Messrs. Pease have done all they can to collect water. As we deepen our workings, and follow the coal into fresh districts, it becomes more difficult to obtain water. In consequence of the Act which limits the extent to which boys are employed, we have increased the number of our workmen about 30 per cent. That is one reason why more water is needed in the district. Another cause is, that the thin seams require more labour to work them than the thick seams. The aggregate amount of unworked coal in the district is something enormous, and will provide work for many years to come. I calculate that on Messrs. Pease's land we have 87,750,000 tons of coal within the seams yet to be worked. Another fact of importance with regard to the supply of water is, that the coal obtained is required principally for the manufacture of coke, and that is a manufacture which requires a large amount of water. We have within Messrs. Pease's area 1543 coke ovens. Every year it is becoming more difficult to get the necessary quantity of water for those ovens from any sources in the neighbourhood. It is certainly necessary that some better provision should be made for supplying it with water, as well for trade purposes as for domestic purposes, if the district is to continue to develop its trade in a natural manner. There are 12,500 ovens in the district, and they require 12 million gallons of water a week. I am satisfied that there is a rapidly increasing population, and an increasing want of water. The works provided for in this bill are necessary for the accommodation of the district. I know the additional district that it is proposed to include. It is desirable that that additional district should have a better water supply. I know of many parts where the want of water is felt very much indeed.

Cross-examined by Mr. PEMBER: One of those parts is the large iron-works near Ferry Hill; they are applying to other collieries for water to supply their works, but they do not get it. The district generally is a pretty prosperous one. The district I have to do with is interested in the Houseslip reservoir, but not in the others. I have not gone into the quantity of water actually consumed per head. I could not say whether it is 20 gallons per day or not. I do not know that 50 gallons per head per diem is a very large quantity. I do not know what is the ordinary quantity sought for in bills. I am quite satisfied, by observation, of the want of water. It is a crying want. I know that the population has increased because my clerks counted the houses, and allowed 5½ as the population of each house. I do not know whether they counted empty houses or not. I do not think there are any empty houses in the district. I fixed upon 5½ rather than 3 or 4 as the number of population in each house, because the year before last I took the exact population in our own area, and found it to be 5¾ to each house. The bulk of this population is a mining population. There is sometimes, in such districts, a difficulty in getting rid of the water. I do not know what the domestic supply is per head. We are working thin seams of coal now. I have not studied this bill. Messrs. Pease are interested in it. I do not think they are the chief abstracters of water. They lose a considerable quantity of water in working coal-mines.

Re-examined by Mr. BIDDER: I come here to tell the committee of the wants of the district for domestic and trade supply. I do not profess to give any opinion as to the merits of the proposed plan. I am here to say that a scheme for additional supply is required in the district. The figures I have given are the result of investigations made under my own direction.

Mr. *A. L. Stevenson*, examined by Mr. BIDDER.

I am a mining engineer, and chief agent for Messrs. Bell Brothers. I have known the district 24 years. I am particularly acquainted with that portion of it which it is proposed to add to the company's district, and there is a great want of water there. I have known women wait at the wells all night at many of the collieries, where they have not at present the benefit of the water company's supply. The collieries with which I have to do have doubled their population within the last four years. There has been a very large demand for coke, and a very large increase in the number of coke ovens. Large quantities are required in the Cleveland and Cumberland districts for working the Bessemer process and the Cleveland iron. That has all tended to an increase in the trade of the district, and to a consequent increase in the population. Messrs. Bell have 4000 acres of coal. They are engaged in sinking several large new collieries. All those will increase the population. The number of coke ovens on our works has been doubled. There are, I believe, about 12,000 in the district, and that number is being constantly added to. For domestic purposes we depend on the surface drains. I anticipate that there will be a continued decrease in the supply of water. I am satisfied that some scheme is required to provide additional water in the district. I think what the company is seeking power for is within the mark as to the quantity required.

Cross-examined by Mr. PEMBER: It is the result of the last bill, and the probable increase of population, that make me think the company are within the mark. I do not know the capacity of the present reservoirs, and what can be sent down for consumption under the powers of the Act of 1866. The present bill would give them about 50 gallons per day per head of population. Considering the district, I certainly consider that that amount is wanted. What makes me believe that is, because some time ago I made an estimate, and found that 30 gallons per day per head of population would be wanted, and I know that the district has much increased since that time. It is a district requiring more water than others. I do not know how much per head this company gives to the population they supply. The district they supply has very few coke ovens; the district required to be supplied has many. Many pipes for which the company already have powers are, I believe, not yet laid. We cannot, of course, get a supply from them until they are laid. I cannot say whether the company would be able to supply us perfectly well if they were to lay down all the pipes authorized in 1866. If the company had sufficient water, and could carry out all the powers granted to them in 1866, we might then get a better supply; but it would only be partial, because the Cockfield district is without their area. I have nothing to do with the company.

Re-examined by Mr. BIDDER: I do not profess to say whether the proposed scheme provides too much or not; but assuming it will supply 50 gallons per day per head of population, I can say that that is not too much. I do not say for a moment that that amount is wanted for the domestic supply, but it is required for the trade of the district. If we do not have a proper supply, the trade of the district must suffer. Large quantities of coke have been lost for want of water.

Mr. *John Rogerson*, examined by Mr. BIDDER.

I am the manager of the Weardale Coal and Iron Company. Our works are in the district supplied, and also in that proposed to be supplied. They are scattered over the whole area of those districts. We have a very large output. It has not very much increased since 1871, but the number of hands employed has been greatly increased. In 1871 we employed 3444 men and boys within the district, and in 1874, 4837. I have not the figures for the additional district. The figures represent a corresponding population of women and children. The colliery villages have suffered from want of water ever since 1868. We have been slightly relieved by the supply the water company are now providing. As the pipes extend we may get some further relief. In the new district we are entirely without any means of supply, and yet we expect soon to employ 2500 men there. We made an estimate of the quantity of water we should require at Tudhoe, the population of that place having lost their water, and we found we should require 157 million gallons per annum; that would represent 500,000 gallons a day. We find an increasing difficulty every year in getting water for our trade purposes. We had our iron-works stopped in 1868 for three weeks from want of water, and last year we had them stopped again from the same cause. An adequate supply is a necessity for the trade. If we do not have it the trade must die, and the district stagnate and suffer. In one week at Tudhoe we paid £100 for the cartage of water. I do not think that 50 gallons a day per head of population is too much.

Cross-examined by Mr. PEMBER: In those figures which I gave showing the amount of water required at Tudhoe, I included the population of Spennymoor, Blackmoor, and another place adjoining, amounting in all to 16,233 persons. I estimated that, for trade purposes and every other purpose, we should want 157 million gallons a year. That makes 33,000 per head of the population. I have no interest in any particular reservoir. I have no interest in the Bedburn and Redford reservoirs. The necessity for those reservoirs depends on how much per head the population require.

Re-examined by Mr. BIDDER: The 157 millions a year that we expect to take from the water company is exclusive of any we might get from any other source. Nearly all the water from our own pits has been lost; it has gone to a lower level. When I said that we had no interest in the Bedburn and Redford reservoirs if we were properly supplied from the others, I forgot that we have works along the line of pipes leading to those reservoirs, which would cause us to require water from them.

By the COMMITTEE: Although in 1871 we employed 3444 hands, and increased it to 4837 in 1874, yet the increase in the output was only from 1,111,000 tons of coals in 1871 to 1,151,000 in 1874.

Mr. *John Marley*, examined by Mr. BIDDER.

I am a mining engineer, residing at Darlington, and also a member of the Institute of Civil Engineers. I have had professional experience in the county of Durham and the neighbourhood for more than 30 years. I am chairman and managing director of the North Brancepeth Colliery. The population has greatly increased lately. Some time ago we had 20 coke ovens; now we have 420, and this winter shall require more. I had the population taken for our company's purposes this month, and found that out of 393 of the houses, the population averaged 5·8. The increase in population will no doubt go on for some years. In four years our company will require a supply for double the present population. I am chairman of another company not far off where we expect an increase in the number of houses from 50 to 400 or 500. Then there is another company with which I am connected, where a similar increase will no doubt take place. The supply of water to the working population has been very bad indeed—so bad that at one of our collieries the whole of the men would not go to work till we promised them to pump water out of the pits for their use, and to secure this very water company bringing their pipes to our colliery, we entered into negotiations with them. They thought they would get their pipes there in 1874, but they are only just getting them now. Our principal pits are within the present district of the company. Assuming that the company have sufficient water in their reservoirs to supply those pits, their authorized pipes would no doubt enable them to do so. Our present want is four times as great as might have been anticipated in 1866. We use large quantities of water in the manufacture of coke. At North Brancepeth we require 420,000 gallons a week. Last year we could not get a supply for one-fourth of the number of our ovens, and we lost coke in consequence. Another colliery, for which I am consulting engineer—the West Hunwick—had the coke ovens stopped for nearly a week for want of water. At another colliery we were losing a fourth or a fifth of our coke for two months from the same cause. So that we had an absolute dead loss, which we could not remedy without establishing water-works of our own. From my knowledge of the district, I think it is essential to its prosperity that there should be an adequate domestic and trade supply. As to the future resources of this district, and the amount of coke to be obtained, when the commissioners surveyed the county of Durham under Sir George Elliott, I was deputy for the south district, which is about the same area as the water-works company's district, old and new, and the output of that district was 1,343,934,058 tons of coal. As to the number of miners, I find from the Government inspector's report that in 1861 there were 30,805; in 1870, 41,100; in 1871, 43,000; in 1872, 45,300; and in 1873, 53,334. The returns for 1874 have not yet been made. As to the collieries, there were 161 in 1871, 170 in 1872, and 175 in 1873. In my judgment the large development of the district, and the requirements of the trade, render it necessary that an additional supply of water should be given.

Cross-examined by Mr. PEMBER: When the authorized pipes are laid down, we shall very likely get an adequate supply if the company can get sufficient water. From my knowledge of the district, I should say that the company cannot at present get a proper amount of water. That depends on the amount of water to be consumed. The company cannot give the required amount of water without additional reservoirs. I do not know exactly what the district is going to take. In 1866 there were very few coke ovens. We require at present four times as much water as would have been anticipated in 1866. I do not know what the estimated consumption was in that year. I know it has quadrupled on account of the number of works requiring water. We have been obliged to pump water from mines for domestic purposes.

Re-examined by Mr. BIDDER: A good number of collieries are being opened up in the southern district, and their population will require a further supply of water.

FRIDAY, APRIL 9.

Mr. *T. F. Hedley*, examined by Mr. MUNDELL.

I have lived at Sunderland for 20 years as a valuer. I was the agent appointed by the county justices under the County Rate Act. That has made me well acquainted with the district and with the several townships and collieries there. I know well the district situated between the Bedburn and Redford reservoirs. There are very important collieries there, and numbers of new ones springing up. The proposed line of pipes would bring water to that district. There is a great scarcity of water there at present. In the district further north, near the Tunstall reservoir there are a great number of large works. It would be a great advantage to have a good supply of water there. I know the district near Durham, and there are several increasing collieries there. Throughout the county generally, collieries and large manufacturing works are greatly on the increase. I am one of the auditors of the Consett Water Company, and I know that there is a great want of water in all the colliery districts, especially where the collieries are near the surface. I have prepared a tabular statement of the area of the several townships and parishes in the district of the Weardale and Shildon Water-Works Company. That table shows the number of houses, the population, and rateable value of all those places in 1841, 1851, 1861, and 1871. In the existing district the number of houses in 1841 was 5193; in 1851, 7462; in 1861, 13,014; and in 1871, 19,138. The increase between 1851 and 1871 is equal to 156 per cent. The population in 1841 was 26,059; in 1851, 38,737; in 1861, 65,276; and in 1871, 98,966, giving an increase in the 20 years, from 1851 to 1871, of 155 per cent. From my knowledge of the district, I can say that it is rapidly increasing. Between 1871 and 1875 there has been an increase of 25 per cent. in the houses, and a proportionate increase in the population. The rateable value, which shows the increase of manufacture was, in 1841, £118,705; in 1851, £124,848; in 1861, £198,075; and in 1871, £444,623. It has more than doubled in 10 years, and in 20 years—from 1851 to 1871—it has increased 255 per cent. In the new district the rateable value has increased from £8099 in 1861 to £40,331 in 1872. That increase is not altogether due to new works erected there, but to the fact that the County Rate Committee have considerably increased the assessments; still there has been a great increase in the new district, both of new works and consequently of the population.

By the REFEREE: The County Rate Act gives the justices more power than the Union Assessment Act gives the Assessment Committee, and there is property which the County Committee have power to rate, but which the Union Assessment Committee have no right to value. We value the mines by taking, first the surface land occupied by the buildings, then the value of the coal, estimated on a reasonable royalty, then the value of the shafts and machinery, and estimate a per centage on that. There will necessarily be a limit to the increase of the district, but it is going on now, and must do so for some time yet to come.

Mr. *George Stratton*, examined by Mr. MUNDELL.

I am a land agent in the county of Durham. I have carried on a considerable business there for more than 25 years. During that time I have acted as agent for several large estates. I am acquainted with the estates of Mr. Surtees, Mr. Elliott, and Mr. Blenkinsopp, the petitioners against this bill. I have carefully examined them for the purposes of this inquiry. Mr. Surtees' place is a very pretty one in the summer time. The proposed reservoir will be at the end and not in front of Mr. Surtees' house.

Mr. MUNDELL here intimated that there was some hope of the parties coming to an agreement as to Mr. Surtees' property; he need not, therefore, continue the examination of this witness.

Mr. *Robert Askwith*, examined by Mr. MUNDELL.

I am one of the assistant engineers of the Weardale Water-Works Company. I have taken a plan of the road at Howe Hill Bridge, showing its position on the Ordnance plan, and its width. It runs along the proposed site of the Bedburn reservoir, and it is proposed to divert it. Many parts of the road are only 9 feet and 10 feet wide. The bridge across the beck is only 10 feet wide between the walls. Our deposited plan shows the proposed diverted road. [The plan was shown to the committee.] The size of the Bedburn reservoir is 101 acres. The gradients of the road are very bad, one of them is 1 in 6.

Mr. *John Emerson* examined by Mr. MUNDELL.

I was employed to take the traffic on this road for one week. I stood on the bridge, and there crossed and recrossed during the whole week, 2 donkeys, 20 horses with 18 drivers, 33 persons, and 1 pig. Those that crossed one way only were 5 persons, 4 horses, 1 pig, and 25 sheep. That was the extent of the traffic for the whole week. On one day during the week I stood for six hours without a creature passing over. Twenty-six of the persons who crossed and recrossed were workers at Hartop mill. If the mill is done away with there will be nobody to cross the bridge except a donkey or two.

Cross-examined by Mr. WHITE: I commenced the week on the morning of Wednesday, the 31st of March, and watched for 12 hours a day, and for one or two days longer than that. I saw no indications of timber going along the road. I do not think any wise person would put a loaded horse upon it.

Mr. *William Harding*, examined by Mr. MUNDELL.

I am secretary to the Weardale and Shildon District Water Works Company, and have been since 1866. Our authorized capital was £150,000, 6000 shares at £25 each, and power to borrow £37,500. There is only £4000 of that which remains to be raised, that is 2000 shares at £2 each. On the 28th of February, 1875, we had expended £222,342, that is £43,141 on parliamentary and preliminary expenses, direction, auditing, salaries, interest and commission, law expenses, compensation, engineering and surveying, and general law charges; £153,114 on our works; and £26,087 on works not shown upon the plans: making up the total of £222,342. We are supplying at present 4872 houses with water. In the limited area that our present pipes cover we supplied during the six months ending February, 1875, for trade purposes only, 92,335,206 gallons of water, or 500,000 gallons a day. We have applications for a further supply from 2216 houses. We have also numerous applications from railway companies and manufacturers for a larger supply, but we are not able to give it.

Cross-examined by Mr. WHITE: The £26,000 has been expended on the Ferry Hill branch. I cannot say whether that was done in anticipation of this bill. I cannot say how many miles of pipes along roads this bill authorizes. I know nothing about the engineering part of this scheme. I have been secretary from the commencement of the company. I do not recollect any complaints as to the non-repairing of the roads having been brought under my notice.

At this point the proceedings were adjourned for a short time, as Mr. Mundell had hopes of an agreement between the landowners and the company. It was found, however, that they could not agree, and the proceedings were resumed.

Mr. *T. Hawksley*, examined by Mr. MUNDELL.

I am an engineer of 50 years' experience. I laid out the present existing water-works. Their capability of supply, when completed, would be 2,500,000 gallons, and 1,250,000 for compensation. The Tunstall reservoir will be completed in about a twelvemonth, and we shall then be able to utilize the line of pipes indicated on the plan. There was a main line of pipes sanctioned in 1866, which has not yet been laid. If we propose to lay out mains for the purposes of service, we must have the consent of the landowners through whose land they would go. Some pipes are laid under parliamentary sanction, and some by the sanction of the owners. The £26,000 which the company have laid out was upon pipes laid down with the consent of the landowners, some of whom, however, have only a limited interest, and we are consequently obliged to come to Parliament for the necessary powers. From what I know of the district, I should say that a proper supply would be 18 or 20 gallons a day per head for the population, and 30 gallons for the trades; in round numbers, 50 gallons a day per head. It is altogether a peculiar district. In an adjoining district we are supplying 60 gallons per head per day, that is 20 for population and 40 for trade. The quantity taken for railways is enormous. We are supplying at Stockton and Middlesbrough 10 million gallons a month for railways, and have received orders for 15 million gallons more. There are, in our district, about 13,000 coke ovens; they require 30,000 gallons a week for each of them. Then the blast-furnaces take a great quantity; pig iron requires 1000 gallons, and finished iron 3000 gallons, for every ton made. The collieries require large quantities of water for various purposes, for the steam-engines and pumps especially. The rolling-mills also consume an immense quantity. The whole country is radiated with railways. There are 20 acres of sidings for the purposes of the iron, coal, and coke business, and all that causes an extraordinary consumption of water. There are more towns now in the district than when the Ordnance map was made; around every colliery a little town grows; every colliery brings nearly 5000 more inhabitants into the district. Taking the quantity required as 50 gallons per head per day, we propose to provide for 200,000 people, and we must be able to give out 10 million gallons a day; and that is what we shall be able to do by the old and the new works. A large population is growing up in the Ferry Hill district, but we shall not reach our maximum for 12 or 14 years. The district cannot be supplied by the Wascrow, Tunstall, and Bishop Oak reservoirs only; the Bedburn and Redford reservoirs are required to supply the low districts. The district is a very hilly one, and we propose that our three present reservoirs shall supply the high levels and the Bedburn and Redford the lower levels. The water which we propose to impound is soft water from the lower sandstone beds. We want that soft water, especially for the works; hard water stops the tuyers of blast-furnaces by a deposit of lime, and is injurious to locomotive engines and boilers. Seven years for the purchase of land and 15 for the construction of our works is not an unusual time. As regards recent Acts of Parliament, in the Oldham case, where they were looking ahead as we are, 18 years have been granted; and in the case of Huddersfield, 20 years have been given. It is necessary to look ahead with water-works, or the ground may be occupied by works which will pollute the streams, and then the water is gone for ever. Our estimate is £600,000, independently of distributing-pipes; so that we seek the usual borrowing powers for another £150,000. The larger part of this bill is not opposed, it is only that part of it relating to the Bedburn and Redford reservoirs. The distance between them is a little more than a mile. The catchment of those two reservoirs is 18,000 acres; at the upper reservoirs we have 30,000 acres. The whole district is 800,000 or 400,000 acres, but the population lies along the lines shown on the plan. The whole of the Redford reservoir is situated on Mr. Surtees' land. The house lies in the fork at the end of the reservoir. The reservoir will no doubt be a very ornamental object. There is a road on the estate which we are going to divert, with Mr. Surtees' consent. That diversion does not injure the estate in the least. As to the farmhouses on the estate, that is merely a question of money. As to the two brooks, we are willing not to interfere with the water beyond a certain point, without Mr. Surtees' consent. The Bedburn reservoir is not upon Mr. Surtees' land, but on Colonel Blenkinsopp's, to the extent of 30 acres, and to a small extent upon Mr. Elliott's. The Linburn reservoir is a small reservoir at a great elevation; that is entirely upon Mr. Surtees' land. He says we shall injure his land, but only in this sense, that we take the land away and cover it with water; but we shall have to pay a satisfactory price for it.

Mr. MUNDELL announced that Mr. Surtees' opposition was entirely withdrawn, but not Mr. Elliott's and Colonel Blenkinsopp's.

Examination continued: Where we do not impound the whole of the water of the district we give more in compensation than what we take away, and we make a special provision that the company shall make compensation in money to all persons injuriously affected by the flow of any compensation water. As to the lands of Messrs. Elliott and Blenkinsopp, it is only a question of 35 acres out of 130 or 140 acres. From the nature of the lie of the land the two brooks mentioned in the fifth paragraph of their petition cannot be of much use. The property is common farming land, and very different to that of Mr. Surtees, which is very fine residential property. The mill belonging to Mr. Elliott on the Bedburn brook is one of the old-fashioned water forges, which are now disused in consequence of iron-works being conducted on entirely different principles. Mr. Blenkinsopp's mill is a small corn-mill on one of the tributaries of the Bedburn Brook. Both mills are just such places as in a district like this are bought out by money payment every day. As to the two farmhouses, that is an ordinary case of damage. We propose to make a road in substitution of one which will be taken away. We believe that the new road will be quite as useful as the old one, and will not be to the disadvantage of either of the petitioners. As to the fifteen years to be allowed for the construction of our works, that cannot be injurious to the Highway Board. Whenever we commence to alter a road it will have to be done in a reasonable time, and subject to the general law. We must also finish a substituted road before we stop up an old one. In our bill we have incorporated all the clauses of the Water-Works Clauses Act, and they relate to such complaints as are made in the petition. Those clauses are found to be sufficient in the metropolis and Manchester, and all the great towns of the country, and why they are not sufficient here I cannot for the life of me see. In fact, we are bound to do all our work in a reasonable time, to make new roads before we shut up old ones, and to keep them in repair twelve months after they are open; and in all cases, if we do not do our duty, summary proceedings can be taken against us.

By the REFEREE: There is nothing exceptional in this district to make it necessary to alter the existing law. It is in many parts almost untraversed, therefore there is no one to be hurt; and surely what will apply to the metropolis will apply here. The population is down below among the mines, to which places our pipes go, but we are on the high levels with the reservoirs, and there it is quite a mountainous district. There is nothing special in this case which will necessitate the employment of additional superintendence; everything is the same as in all the ordinary parochial districts of England. The roads are of the commonest description. The great business is done by railways, which run all over the country like the spines of a fish. I consider 21 feet quite sufficient for the width of the proposed road. We take powers to stop up all roads which are not carriage roads. As to the stopping up of a bridle road, as alleged by the petitioners, we never heard of its being a bridle road until the petition was sent in. We propose to stop it up. We supposed it was a private road.

Mr. WHITE said he was instructed to say that now that the company were willing to place the Highway Board in a better position than they would be under the provisions of the Water-Works Clauses Act, and were willing to give compensation for special expenses, such as would be incurred in this case, the board had no further opposition to offer.

Mr. PEMBER said that after consultation with the other side, he believed all difficulties were removed except one, which seemed to be raised more by the engineer than the agent. The question, which was quite a technical one, was this—if a certain divergence of the road, not shown on the plan, but essential for Mr. Elliott, was made, the matter might be settled as between the parties, but if it were done, not having been down on the plan, there was danger lest, when they came to the Standing Orders in the other House, the bill might be lost.

Mr. MUNDELL said that was only a part of the difficulty. The Highway Board, though perhaps willing to consent to this divergence to oblige Messrs. Elliott and Blenkinsopp, could not bind his constituents to repair a substituted

road not upon the parliamentary plan. In the end the water company might have to repair it for ever.

Mr. HAWKSLEY said, in reply to the committee, that the promoters were willing to make the divergence suggested by Mr. Elliott, but the difficulty was with regard to the Standing Orders. They would be adding a road not marked on the plan at all; and anybody might petition against the company in the House of Lords.

The CHAIRMAN said that as Mr. Pember considered the point a vital one, and the parties were not able to agree, he must adjourn the committee till Monday.

MONDAY, APRIL 12.

Mr. PEMBER said that happily the parties had been able to agree, and a clause would be inserted in the bill, the effect of which would be to protect the interests of Messrs. Elliott and Blenkinsopp with regard to the proposed road on their property. It was now agreed that at some future session the company would seek to obtain another bill, and until that was either passed by Parliament or rejected, they would not attempt to make the Bedburn reservoir without Messrs. Elliott and Blenkinsopp's consent. This agreement specially related to Mr. Elliott. Mr. Blenkinsopp was too ill to be consulted, but it was thought well not to continue his opposition independently of the others, and they had little doubt but that eventually, he would be a party to the agreement.

The CHAIRMAN said that the committee found that the preamble of the bill was proved.

Legal Intelligence.

BRISTOL SPRING ASSIZES.—FRIDAY, APRIL 9.

(*Before Lord Chief Baron* KELLY *and a Special Jury.*)

FARE *v.* THE BATH GASLIGHT AND COKE COMPANY.

GAS EXPLOSION AT BATH.

Mr. COLLINS and Mr. LEWIS appeared for the plaintiff; Mr. COLE, Q.C., Mr. LOPES, Q.C., and Mr. SAUNDERS for the defendants.

Mr. COLLINS said that was an action brought by the plaintiff, Mr. Fare, who was a carpenter residing at No. 1, Dalton Cottages, Bath, against the Bath Gas Company, to recover damages for injuries he alleged he had sustained at defendants hands, his furniture having been destroyed, and his wife very seriously injured, by an explosion that took place from an escape of gas from the company's mains on the 22nd of January last. The Bath Gas Company was an incorporated company supplying the city of Bath with gas, and they had the power to open the roads for their mains and bring their gas into the different houses, and it was obvious that a company possessing such powers must exercise very great precaution not to allow any escape of gas, seeing that proper materials were used, and that the mains and service-pipes were kept in proper order. The main-pipe, the defect in which caused the explosion, was laid down in the Upper Hedgemead Road, Bath, and running at right angles from that road there were two cottages, called Nos. 1 and 2, Dalton Cottages. The ground above the Upper Hedgemead Road was a sloping road, and he (Mr. Collins) thought the jury would find there had been for some time a pressure upon the gas-main arising from the subsidence of the ground upon the pipes. The garden of No. 1, Dalton Cottages, was 5 feet higher than the Upper Hedgemead Road, and a retaining wall had been built by the side of the road, and next to the wall there was a tar or asphalte pavement. The service-pipe ran from the main across underneath the tarred paving, and was then clamped by the retaining wall, and by that means the gas was conveyed into the meter which supplied the plaintiff's house. On the 22nd of January the plaintiff smelt gas in the scullery early in the morning, but was unable to find out where it escaped from. He made a very careful survey of the pipes in the house; he found they were all sound, and he also took the extra precaution of turning the gas off at the meter, so as to be quite safe. The plaintiff went out about nine o'clock, and returning some time in the morning he found the smell still existing. He gave his wife instructions to write to the gas company, which she did, placing the letter in a box or pillar, in which the company requested that all complaints might be left. The plaintiff went out again, and at about half-past eleven o'clock a tremendous explosion took place; Mr. Fare's house was blown to pieces, the whole of his furniture destroyed, and his wife, who was upstairs at the time of the explosion, was blown completely out of the house; one of her ankles was broken, and she was very seriously bruised and injured. The force of the explosion was so great that not only was No. 1, Dalton Cottages, blown down, but No. 2 was also blown to pieces, and an unfortunate person in that house was killed from the effect of that explosion, and Mrs. Fare, the plaintiff's wife, had been under medical care ever since. Shortly after the explosion the gas company's officers came to the spot, opened the ground over the main in the Hedgemead Road, and found that the service-pipe, leading from the main to the plaintiff's meter, was detached, and there could be no doubt—he believed it would be admitted on the part of the gas company— that a large quantity of gas escaped from the hole, and as it could not rise through the tar path, which was gas proof, it passed under the ground some distance, and found its way into a space of 2 feet under the plaintiff's kitchen. The gas accumulated there came up through the floor, and, there being a fire in the kitchen, the gas exploded, causing the injuries described. It appeared that the main had been broken at that point on a previous occasion, and had been repaired by placing on it what was technically called a "thimble;" but whether gas escaped from the main in consequence of that he could not tell, though it was clear that it did escape from the junction of the service-pipe with the main. The negligence which the plaintiff charged against the Bath Gas Company was that they knew the nature of the ground—that it was very liable to subside—and that instead of putting a common cast-iron pipe in a common trench, they should have taken certain precautions to prevent the ground pressing against the pipe, by putting in an arch or driving piles. The defendants had had warnings of the dangerous nature of the ground in Hedgemead Road, for in January, 1873, the main-pipe there had broken, and that fracture had no doubt been caused by the pressure of the ground upon it; and the service-pipe of No. 2, Dalton Cottages was torn from its place some months before, to the knowledge of the company, and was repaired by them. He should therefore fix the company with the knowledge that the ground there was dangerous, and required constant supervision. Another thing was, that for some days previously there had been an escape of gas, the people round about the neighbourhood having smelt gas; and upon the authority of a case he should hand to his lordship, he (the learned counsel thought) would lay down to them that there ought to be such supervision that upon an escape of gas for two or three days some steps ought to be taken to prevent such an escape. Another cause of negligence was the way in which the service-pipe was attached to the main, which required that considerable care and skill should be exercised. He believed that the proper way was to drill a hole in the main-pipe, and it was necessary that the hole should be exactly round, that the thread of the service-pipe might fit the thread in the main-pipe, and greater precaution should be taken in ground such as that in Hedgemead Road. If the hole in the main-pipe was imperfect and the service-pipe did not exactly fit, it stood to reason that a very slight pressure would detach the service-pipe from the main, and any amount of injury might be done. He should produce the portion of the main-pipe, and the jury would have to determine whether the junction was made in a workmanlike manner. He should show that if the main-pipe was drilled at all it was not drilled properly. The hole appeared to have been clumsily punched, for the inside of the pipe was scaled off, thus reducing its thickness, and it would be shown that the worm of the service-pipe never "bit," as it was called, the worm of the main-pipe, and that only about one and a half of the threads of the screw ever went into the main-pipe at all, the rest being clumsily filled up with a quantity of white lead. The jury would have to say whether the state the pipes were in did not show considerable negligence on the part of the gas company, for under such circumstances the slightest pressure would detach the service-pipe from the main, and an escape of gas must ensue. The learned counsel concluded by remarking that what the plaintiff said was, first, that the main-pipe was improperly laid; secondly, that the hole in the main-pipe was improperly made; and, thirdly, which was admitted by the gas company, that the gas which caused the explosion came from that particular part of the main-pipe to which the service-pipe was attached. That being so, it would be for the jury to say whether, upon the facts which he had opened being proved, the negligence of the defendants would not have been established, and that they were therefore liable for the injury which had accrued to the plaintiff.

Mr. *Fare*, the plaintiff, deposed to the facts opened by the learned counsel. He said he had £11 in the house immediately before the explosion, and he only recovered £4 10*s*. His furniture was completely smashed, and he was not able to make any further use of it. He estimated his loss on the furniture at £105 8*s*. Since the accident he had been residing with his father-in-law, who provided board and lodging and all necessaries for himself, wife, and three children. He would have to pay his father-in-law, but did not know what his claim would be. When first he saw his wife after the explosion, she was lying on a sofa in a neighbour's house. Her feet appeared to have been crushed, and she was in very great pain. She had been attended by two doctors, and had had the services of two nurses.

Mrs. *Catherine Ann Fare*, wife of the plaintiff, was carried into court in a chair, and corroborated the main portion of her husband's evidence. She wrote a letter to the company complaining of the escape of gas, and put it in the company's box, in Old Bond Street.

Mr. COLLINS called for the production of this letter, but it appearing that it had not been received until after the accident, it was not put in.

Witness described the nature of the accident, said she became insensible, and when she recovered consciousness she found that she was bruised all over, her feet were very much injured, and she was in great pain. She had not been able to get about since. Could neither walk nor stand, even with the aid of crutches.

Mr. COLLINS put in the answers to certain interrogatories which had been made by Mr. Helps, secretary to the gas company. The gas escaped from the company's main by the tearing away of the service-pipe, and not from any defect in the company's main.

Mr. *Henry William Hicks*, surveyor, of Bath, deposed to having been present when the ground was opened on the 25th of January. The service-pipe was detached from the main. A part of the inside of the main was chipped away, which made it thinner.

A JURYMAN inquired whether there had been a good supply of gas in the plaintiff's house on the night before.

The plaintiff was recalled, and in answer to his LORDSHIP said he had four burners in his house. They were all lighted the night before, one being lighted the whole evening. Had noticed for some little time that they had not so good a light as before.

By Mr. COLE: Made no complaint of that to the company.

Mr. *Hicks*, in answer to a further question, said the tearing of the service-pipe from the main indicated a subsidence of soil.

Mr. *S. Edwards*, plumber and gas-fitter, of St. Augustine's Bank and Colston Street, Bristol, stated that he had had considerable experience in the laying of gas-mains. In laying a main in a light sandy soil he would "pile." In a loose stony soil he would build dwarf walls or turn small arches to carry a main, and that would prevent the main from sinking. The hole in the main produced (the portion of the main where the accident occurred) was but partially drilled. The remainder was cut out by a diamond point. The hole was not perfectly round, and there was not a continuous thread. The junction was not, in witness's opinion, properly effected.

Mr. *J. T. Harris*, engineer, ironfounder, and contractor for gas-works, of Clare Street, Bristol, stated that he had contracted for the laying of gas-mains in different parts of the country. No one, without taking precautions, would lay a cast-iron pipe in subsiding or shelving ground. If a client of his insisted upon having a gas-main laid in such ground, he should use a pipe of some malleable substance, either wrought iron or lead. His impression was that the service-pipe produced had never held at all, but that it had been simply pushed into the main. If the pipe was properly screwed into the main, and there was a proper depth of thread, the pipe ought to break before it could be drawn from the main by pressure.

Cross-examined: The road called Hedgemead Road was not such a road as would be permitted to be made by the Bristol Sanitary Authority. Did not know that the road was made by the Bath Sanitary Authority.

Mr. *O. B. Watts*, plumber and gas-fitter, of Perry Road, Bristol, was examined as to the manner of laying gas-mains and making the connexion of service-pipes. He did not consider the connexion with the main produced was properly made. In a place where he found shifting ground he would use piles. He considered the hole in the main produced had not been properly bored; it was not round. There was no complete "thread" in the hole, and there ought to be at least five. The service-pipe did not go far enough into the main-pipe. Not more than one complete thread could fit.

Mr. *R. Pope*, an engineer and ironfounder, said he had examined the pipe produced, and considered the thread imperfect.

Mr. *E. Chappell*, a milkman supplying milk in the neighbourhood, stated that there was a strong smell of gas for a week before the explosion. He did not report it to the gas company.

Mr. *C. S. Barter*, surgeon, Bath, said that on the 23rd of January he was called in to see Mrs. Fare. He found her suffering from a fracture of the right outer ankle, and her legs were lacerated. He had attended her since, for some time twice a day, and for some time once a day. She sustained a severe shock of the system, and was now unable to stand. It would be from four to six months longer before she would be quite recovered. His charges would probably be from £30 to £50.

Mr. *R. S. Fowler*, surgeon, of Bath, said he saw the plaintiff's wife very shortly after the accident. She was in a state of great collapse, and almost insensible. The ankle of the right foot was broken, and the left very much out of place, and the ligaments lacerated very considerably. There was very great swelling, and she was suffering great pain. She had suffered very considerably from the shock to the system, and he should think it would be at least six months before she was recovered. His charges should be about 25 guineas. She required very nourishing food.

This was the plaintiff's case.

Mr. COLE addressed the jury for the defendants. He was sure there was nobody more distressed at the accident to this poor, respectable young lady than the gas company themselves; but they felt they had a duty to their shareholders in seeing that the matter was thoroughly investigated. The company were charged with negligence, and that was a very serious imputation against them; and, although they might be most willing to make any fair and reasonable compensation to this lady for the accident she had sustained, they felt that the conduct of their officers had been most seriously impugned, and they would rather the whole case came before the jury. As far as the company had been able to investigate the case, they had come to the conclusion that there was no possible blame to be attached to any of their servants, that the accident was an inevitable one—one

that no human foresight or skill could obviate, and one that it was impossible for them to foresee or prevent. It was, perhaps, the most extraordinary accident in the history of gas companies, for, so far as could be gathered, it was not caused by an escape in the house, but in the middle of the public highway; and the gas must have made its way under many feet of soil into the kitchen, which it filled, and getting mixed with atmospheric air, it came in contact with the fire and exploded. That the accident occurred from the service-pipe becoming detached from the main was pretty evident; but gas companies were not insurance companies, and they could not guarantee safety. He remarked that that was the first time since the gas company was started that any charge of negligence had ever been brought against them, and he thought that the jury would come to the conclusion that the company had fulfilled their duty in the most perfect manner. The curious part of it was, that, as far as could be gathered, there was no escape in the house, but in the middle of the road. That gas must have made its way through many feet of soil, under the path, under the wall, and then again up 5 or 6 feet of soil, and in some way or other percolated the soil under the house, and have got into the plaintiff's premises. This was the first charge of negligence which had ever been brought against the company. The real question was whether the work was properly done at the time or not. He would show that the screw was a very good one indeed. The company never had the slightest notice that anything was wrong in that unfortunate service-pipe. The cause of that subsidence was probably an escape of water. A very few yards from where this service was there was a leakage of water, and that must have got underneath the soil, making it more liable to slip than it was before, and so it was caused to slip. That was the only way they could account for it at all. The company felt that it was a great misfortune that had happened to this highly respectable young lady, but they believed they were not liable. If the jury thought they were liable, and ought to pay, they would not resist a verdict for fair and temperate damages; but he contended that they were not legally responsible for the results of this sad accident.

Joseph Pearce, smith and main-layer in the employ of the Bath Gas Company, said the main in question was originally laid in October, 1870, and he was head workman employed in laying it. The pipe produced was a piece of the main. He could not tell whether the hole was cut or drilled. They sometimes cut and sometimes drilled them. Provided proper care and skill were used, it did not make much difference whether they were cut or drilled. Had had 27 years experience. [The learned counsel requested the witness to examine the hole in the main.] Taking it altogether, it was not a bad hole. He did not see it was much out of being round. It ought to be quite round. There was a tolerably good thread. Two threads would bite, and they would measure about 3-16ths of an inch. Having regard to the place where the main was laid, the ground not being firm, he did not think the service-pipe went far enough into the main.

In cross-examination, *witness* said he was not the foreman of the men. The foreman was now dead. There was a bit chipped off the hole in the main produced. Had he seen that before the service-pipe was connected, he would, as a careful man would, most likely have plugged that hole and cut another. He knew that there was a subsidence at No. 2, Dalton Cottages, in 1872, and that the service-pipe was torn away from the main by it, but he had never examined the pipes since. There was a subsidence a year ago, but he did not examine the pipes.

His LORDSHIP, referring to the evidence of this witness, asked Mr. Cole if he did not think that the attention of the company should have been called by their servants to the state of the main, and said the jury would have to judge for themselves. He remarked that the witness had said that he discovered a year ago that the ground had subsided and carried down the main, and one would have supposed that that required examination and consideration. Besides, the witness admitted that the connexion between the service-pipe and the main was insufficient for the purpose.

The FOREMAN of the JURY: We are perfectly satisfied that there was negligence.

His LORDSHIP: It is impossible to keep up the case after such evidence.

Mr. COLE: My learned friend made an offer at the close of his case.

Mr. COLLINS: It was refused, and ought not to be mentioned.

Mr. COLE remarked that he had now told his learned friend that he would accede to his offer, but he did not now adhere to it.

Mr. COLLINS: I made an offer, which was refused.

His LORDSHIP: See if you can agree amongst yourselves.

Mr. COLE said he had a number of scientific witnesses to call on the question of negligence, and if pressure were put upon him he should fight the case out to the end.

The learned counsel having conferred,

Mr. COLE said he was happy to say the case was settled. After the evidence of the last witness, he felt, as his lordship did, that they could not longer contest the case, but he should mention that the company had been kept perfectly in ignorance as to the real state of affairs.

His LORDSHIP: No doubt about it.

Mr. COLE: If the slightest representation had been made to the company of any danger, they would have taken every precaution in their power. The most graceful thing the company could do, after this evidence, would be to consent to a verdict for £350, and pay all costs.

The FOREMAN of the JURY: We should have been pleased to give a little more.

The JUDGE: I should have given half as much again.

The verdict, as agreed to, was recorded.

ESSEX QUARTER SESSIONS.—WEDNESDAY, APRIL 7.
(*Before Mr.* T. KEMBLE, *Chairman, and other Magistrates.*)

STEALING COKE FROM A GAS COMPANY.

Henry Fallows was indicted for stealing coke from the Imperial Gas Company, at West Ham, on the 1st of March.

Mr. WIGHTMAN WOOD prosecuted; Mr. CROOME defended.

It appeared that the practice of the company is, as they make a great deal of coke, to sell it in sacks of three bushels each. Persons are required first to go to the office and obtain a ticket for the quantity of coke they require, which they take to the yard, when one half the ticket is given to the foreman, and the other to the gatekeeper as they leave. The police officer on duty (Reynolds) observed the prisoner enter the yard with his cart and go for coke. He saw one sack of coke shot loosely in the cart, and after that six full sacks placed in it, with which the prisoner was driving off, when the officer followed him and inquired how many sacks of coke he had. On his informing him six, he taxed him with having the loose coke, and took him to the manager, Mr. Donnelly. On examination of the cart it was found that the sacks contained four bushels each, instead of the regular quantity, and the prisoner said he hoped the manager would look over it.

The JURY found the prisoner guilty, and he was sentenced to nine months hard labour.

SOUTHWARK POLICE COURT.—MONDAY, APRIL 12.
(*Before Mr.* BENSON.)

RIGHTS OF GAS COMPANIES.

The Rev. *Charles Abdiel Seaton*, M.A., was summoned by the Phœnix Gas Company for the non-payment of £9 6s. for gas consumed by him at Jeffery's Road, Clapham, up to the 16th of February last.

Mr. *Allen*, the company's arrear collector, proved the consumption of the gas up to the time of the defendant leaving the premises, and numerous applications he had made prior to that for the arrears due up to Christmas. He added that the defendant had given the company a great deal of trouble, and set them at defiance.

A *clerk* from the office of Mr. Murray, solicitor, said they were instructed by the defendant's friends to settle his affairs. The rev. gentleman had been discharged from his curacy, and was unable to pay the company. His friends, however, were willing to assist him and had offered a composition to his creditors.

The MAGISTRATE asked whether proceedings were being taken in the Bankruptcy Court.

The *solicitor's clerk* replied that they were filing a petition for liquidation, and the gas company were added on the list of creditors.

Mr. *Allen* submitted that the defendant could not compel the gas company to assent to liquidation.

The MAGISTRATE was of the same opinion. The company's Act gave them great powers, and if called upon he must carry the law out by committing the defendant to prison in default of payment or distress.

The *solicitor's clerk* said the defendant had neither goods nor money. He submitted that the company had no priority over other creditors.

The MAGISTRATE thought otherwise, and made an order for the payment of £9 6s., and 4s. costs.

HAMMERSMITH POLICE COURT.—FRIDAY, APRIL 16.
(*Before Mr.* INGHAM.)

CAUTION TO GAS CONSUMERS.

Henry Ward and *Samuel Hoyland* were finally examined on the charge of defrauding gas consumers.

Mr. GRAIN prosecuted on behalf of The Gaslight and Coke Comany; Mr. LOUIS LEWIS appeared for Hoyland.

The following further evidence was given :—

Mrs. *Annie Caroline Davison*, of Prince of Wales's Terrace, Kensington, said that on the 1st inst. Hoyland called at her house and represented that he had come from the gas company. He said the company were changing their gas, and if she did not change her burners the ceilings would be blackened and the furniture spoiled. He told her that by using his burners there would be a saving in the consumption of gas. She paid him £3 10s. for 36. She was certain he did not state that he came from gas engineers.

A number of similar cases were heard against both prisoners. Receipts were given in the name of Ward and Co., gas engineers, City Road.

Mr. *Thomas Carter*, chief inspector to the company, said they had not instructed any firm to supply burners to the consumers.

Ward said the company were jealous because his regulators consumed one-half the quantity of gas.

Mr. INGHAM committed the prisoners for trial, consenting to accept bail.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the usual Weekly Meeting on Friday last—Sir JAMES HOGG, M.P., in the chair,

The Parliamentary Committee made the following report in reference to the accounts of The Gaslight and Coke Company for the last half year:—

Spring Gardens, April 13, 1875.

Your committee have to report that they have considered the report and accounts of The Gaslight and Coke Company for the half year ended December 31, 1874, referred by the board on Friday last. The accountant has made a report on the result of the operations of the company during the year 1874, at the increased price awarded by the Revising Commissioners (viz., 5s. per 1000 cubic feet), and, as the correctness of the figures and estimates brought before the commissioners by the company at the beginning of last year, to show the need of a great increase of price, was challenged by the board and the City Corporation, it is interesting to see how far the result justifies the position then taken up. It appears that the actual produce of the year was better than the company anticipated by £75,425 8s., for, whereas the company estimated that the increase of price awarded would yield a surplus of only £4255, with which to meet the charge for the insurance-fund, it really yielded a surplus of £79,680 8s. The Revising Commissioners, however, estimated the surplus, after hearing the corporation and the board, at a higher amount than the company. The commissioners considered (besides other smaller differences) that the company had over-estimated its charges for coal, and under-estimated the probable consumption of gas. The commissioners did not particularize each alteration they made in the company's figures, but the total alterations amounted to £26,610. The result of the year's working is a surplus larger than the commissioners estimated by £48,815 8s., or larger than the sum needed for the full dividends and for the insurance-fund by £48,180 8s.

Your committee would draw the attention of the board to that portion of the report which states that, "in the award made by the commissioners for the year 1874, the price of gas fixed by them on a rental of upwards of a million sterling per annum, proved, on the 31st of December, to differ from their estimate of the requirements of the company made at the commencement of the year by the sum of £534 only." This statement may unintentionally mislead the public, as the inference may be drawn that the whole of the increased price of gas in 1874 was necessary, with the exception of what produced the insignificant sum of £534. There is nothing in the published accounts to explain this calculation, but your committee have been given to understand that the result of a readjustment of coal contracts, arranged by the directors in the first half of the year, and alluded to in their report on the 30th of June, produced a saving to the company of £48,714. But for this saving, the realized surplus of £48,180 8s. would have been turned into a deficiency of £534.

It should be remembered that the coal contracts of this company were severely criticized before the commissioners, and it was stated, on behalf of the board, that the cost was capable of reduction to the extent of £71,759. The commissioners, in their award, remarked as follows:—"Having regard to the facts that the price of coal during 1873 was considerably above the average price of the preceding period of seven years, and was continuously falling throughout the year, and to other considerations, we think that with due care and management the company would have left a large proportion of the required coal uncontracted for, and would thereby, in the events which have happened, have saved for the consumers a considerable sum; we accordingly deduct a sum from the company's estimated outlay for coal in 1874, or, in other words, in arriving at the price of gas, we disallow that sum as an outgoing of the company. We also put on the quantity of coal left uncontracted for a somewhat lower price than that estimated by the company." The sum deducted by the commissioners is not stated, but it must have been about £20,000. Taking coal and coke together, the account shows that the cost was over-estimated by the company to the extent of £56,901.

It may also be interesting to the board to know that the estimates laid before the commissioners on its behalf as to the sale of gas in the year have been fully realised. The company estimated an increase of 2·1 per cent. beyond the year 1873, and the commissioners allowed 2½ per cent. The board had estimated the increase at 5 per cent., and the actual sale was even beyond this. The cost of purification, also, about which there was much discussion, and which the board sought to reduce by £4784, fell short of the estimate by £3133. And the balance of the cost of the stokers strike of 1872, defrayed in 1873, which it was urged before the commissioners should be charged on the dividend of 1874, has, through the action of the City Corporation, been deducted from the dividend payable for the last half of the year.

But the most noticeable feature of the year's operations is this, that in an exceptionally dear year the charge for gas was raised beyond what was necessary to earn a full dividend of £180,000 on the ordinary share capital by the gross sum of £79,680 8s. Of this surplus, the sum of £31,500 will be carried to the insurance-fund, a fund to which nothing had ever before been carried beyond the reserved fund and accumulations of the Equitable Gas Company, which were transferred to The Gaslight and Coke Company when the Equitable Company was amalgamated with it. The balance—£48,180 8s.—will be carried over to the dividend account of the present year, and will be sufficient to pay 2¾ per cent. of the dividend on the ordinary share capital. The excess of price in 1874 beyond what was required to pay the full dividends was 4½d., but of this excess 1¾d. was needed for the insurance-fund. The excess of price beyond what was required for any purpose in 1874 was 2¾d. per 1000 feet.

Mr. NEWTON (the chairman of the committee) moved that the consideration of the report be adjourned till Friday next, which was agreed to.

The SOLICITOR reported that the second reading of the Metropolis Gas Regulations Bill had been postponed until the 4th prox.

The CHAIRMAN stated that he had endeavoured to get the bill set down for second reading at the earliest possible date, and that the 4th prox. was the first day open for the purpose.

CITY COURT OF SEWERS.—At the meeting of the Commissioners on Tuesday last, the Streets Committee, reporting relative to the ring of gas-jets in front of the Mansion House, said it had been removed, owing to the cost. Mr. Shuter moved the adoption of the report. Mr. Bedford took exception to the report. The opinion he had heard from all quarters was that the new mode of lighting was a success. Mr. Cox thought they had made a wasteful expenditure in the matter. Mr. Haywood, replying to Mr. Cox, said the lights in this ring cost five times more than the ordinary lamps. Mr. Cox said that result could have been ascertained after a few weeks trial, and there was no necessity to expend nearly £160 on an experiment lasting a whole year. His opinion was that the question should not be dealt with by the committee, but be referred to the engineer to put up a proper lamp at this spot. In Manchester, St. Ann's Square was lighted by one standard lamp, which lighted the whole of the square, at an expense of £30 a year.

METROPOLIS GAS (REGULATIONS) BILL.

[From the *Chemical News.*]

This bill is described as one for regulating the metropolitan gas companies, and has been introduced by the corporation and the Metropolitan Board of Works. The object of the bill is twofold: first, to remedy the defects which experience has shown exist in the City of London Gas Act, 1868; and, secondly, to bring all the metropolitan companies under as nearly as possible uniform regulations. We wish we could congratulate the two authorities responsible for the bill on their new attempt at legislation, but truth compels us to express the opinion that a more crude and unworkable bill has seldom been presented to the House of Commons. How far it can be modified in committee (if it should ever reach that stage), so as to be a useful measure, remains to be seen, but we much doubt if those local authorities, who have taken the trouble to act on the powers given them by the Act of 1868, will care to be brought under the more cumbrous and expensive system of the present bill. We had hoped that, when so comprehensive an Act as the present was proposed, it would have begun by making a clean sweep of all the older Acts, and have contained within itself all necessary enactments. Instead of this it begins by repealing for all the metropolitan companies just those clauses of the Act of 1860 which were repealed for the City alone in the Act of 1868. The Act of 1868 is nominally repealed, but it is reproduced with but few alterations, almost *verbatim*, some of the alterations being altogether inconsistent with parts of the bill which are left untouched.

One of the evils which experience has shown to exist under the Act of 1868 was this, that, whenever through any circumstances a gas company could not pay a dividend of 10 per cent., they could call on the Board of Trade to appoint commissioners to revise the price to be charged for gas, so as to give the shareholders their 10 per cent. dividend, thus relieving the company of all the chances of trade, and ensuring them a regular 10 per cent. at the expense of the public.

The attempt to remedy this defect is one of the most curious we ever remember; for while enacting that under no circumstances shall a company pay more than a 10 per cent. dividend, the bill goes on to provide that, if a gas company charge more than 3s. 9d. per 1000 cubic feet, "for every penny or part of a penny charged in excess of such price, the dividend shall be reduced by 5s. per cent. per annum."

Is it possible that the Metropolitan Board are not aware that this scheme has been proposed before, and rejected at once by the House as too monstrously unfair to be listened to? It is virtually saying to the companies, if things are dear, you shall bear the burden; if they are cheap, we will have the benefit! What inducement have the companies to exert themselves to make gas for less than 3s. 9d., if the whole benefit of their exertions is to go to benefit their customers? We venture to say that the public would have a much better chance of cheap gas, if it were made a matter of give and take; decrease the dividend if the companies increase the price of gas by all means, but if they lower it, let them increase their dividends in the same proportion. The public are surely better off with gas at 3s. 5d., though the company gets 11 per cent., than they are with gas at 3s. 9d., though the company only gets 10 per cent. We have every reason for thinking that a sliding scale of dividend, both upwards and downwards, would be equally acceptable to the companies and the public, and it is much to be regretted that the opportunity of thus making the interests of the companies and the public identical, instead of antagonistic, should have been lost.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London water companies during the month of March, 1875. According to their returns, 109,352,118 gallons, or 496,837 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 211·9 gallons (96·3 decalitres), rather less than a *ton* by weight, to each house, and 29·8 gallons (13·5 decalitres) to each person. According to the returns of the London water companies made to the Select Committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total supply of water for all purposes was for domestic use. Applying this proportion to the total quantity supplied daily in the month of March, 1875, it may be estimated that about 89,668,737 gallons were used for domestic purposes, or about 24·5 gallons per day for each inhabitant, against 24·9 in the corresponding month of last year. This proportion varies from month to month, but the Reigstrar-General has no means of giving a more exact estimate.

COMPANIES.	Number of Houses, &c., supplied in Mar., 1874.	Number of Houses, &c., supplied in Mar., 1875.	Aver. Daily Supply of Water in Gallons* during Mar., 1874.	Aver. Daily Supply of Water in Gallons* during Mar., 1875.
Total supply	508,818	516,154	109,544,116	109,352,118
From Thames	238,786	242,244	57,489,758	55,692,098
„ Lea and other Sources	270,032	273,910	52,054,358	53,660,020
THAMES.				
Chelsea	28,395	28,490	8,066,700	7,092,400
West Middlesex	45,507	46,615	8,715,561	8,926,416
Southwark and Vauxhall	79,582	79,960	18,105,200	18,250,000
Grand Junction	34,718	35,231	10,949,397	9,957,182
Lambeth	50,584	51,948	11,632,900	11,466,100
LEA AND OTHER SOURCES.				
New River	121,908	122,999	24,133,000	25,274,000
East London	105,562	107,294	21,369,000	21,990,000
Kent	42,562	43,617	6,552,358	6,396,020

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for March, 1875, as compared with that for the corresponding month of 1874, shows an increase of 7336 houses, and a decrease of 191,998 gallons of water supplied daily.

Dr. Frankland, F.R.S., reports that the water drawn from the Thames during March, and supplied by the metropolitan companies, was "in a very impure condition;" that delivered by the Chelsea, Southwark, Grand Junction, and Lambeth Companies was "slightly turbid, and contained moving organisms." The West Middlesex was the only company that supplied efficiently filtered Thames water at the time when the samples were drawn. The Lea water supplied by the New River and East London Companies was of improved quality, and was efficiently filtered. The Kent Company's water (derived from deep wells in the chalk) was of the usual excellent quality. Taking unity to represent the amount of organic impurity in a given volume of the Kent Company's water, the proportional amount in an equal volume of water supplied by each of the other metropolitan companies was—New River, 3·1; East London, 5·1; Grand Junction, 6·6; Lambeth, 6·7; West Middlesex, 7·6; Chelsea, 7·9; and Southwark, 8·4.

HYDRANTS IN THE CITY.—At the Court of Common Council on Thursday last, a report was brought up from the Gas and Water Committee on the reference of the 15th of October, 1874, to carry into execution report on the reference of the 15th of October, 1872, to consider if any improvement can be suggested in the supply of water in case of fire, either by fixing hydrants, or other methods; and recommending that the committee should be authorized to take advantage of the repaving of streets or the placing stand-pipes in the poorer neighbourhoods of London by the Commissioners of Sewers, to place additional pipes for the supply of hydrants in such localities, at an expense of not exceeding £1000. The consideration of the report was adjourned.

Major Bolton's report for the month of March states that throughout the month the condition of the water in the river Thames at Hampton, Molesey, and Sunbury, where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, and East London Companies are situated, was generally good. The highest flood state of the river at Hampton during the month was 2 feet 3 inches above the (6 feet) summer level, and the lowest 1 inch below. At Seething Wells, Kingston, the state of the water in the river was good on 14, indifferent on 5, bad on 6, and very bad on 6 days during the month. The heavy floods mentioned in the reports for the last three months have continued during the first part of the past month. While these floods prevail the Chelsea Company are compelled to take in dirty and turbid flood water, in which there is a considerable amount of solid matter, too fine to settle, arising from the chalk and clay carried down by the floods. This is difficult of removal by filtration, being only practically got rid of by long subsidence previous to filtration. The highest state of the flood water at this place was 3 feet 4 inches, and the lowest 5 inches above summer level. The highest temperature of the water during the month was 47°, and the lowest 34°, while the highest temperature of the air at the same place was 55°, and the lowest 32°. These observations were made daily at 9 a.m. The rainfall during the month was ·73 inches. The water at the intake of the New River Company was not much affected by floods during the month, but the intake was closed while the water was in a bad condition. The West Middlesex Company, having large reservoir capacity for subsidence, avoid taking in water when floods prevail, thus enabling them to filter their supply very efficiently. The Grand Junction Company are increasing the capacity of the filter-beds at Kew by about 5 million gallons.

CHELTENHAM WATER-WORKS COMPANY.—On the 7th inst. there was a sale of stock in the Cheltenham Water-Works Company at the auction-mart of Messrs. Engall, Sanders, and Co. Mr. Sanders occupied the rostrum, and there was a large company present. The stock consisted of 33 £100 shares and one of £137 10s. original value. The first six shares of £100 stock were sold for £960, or £161 per share; the next two for £320, or £160 per share; the following five shares for £800, or £160 per share; the two succeeding lots for £322, or £161 per share; the next five for £800, or at the rate of £160 per share; the three following for £480, being £160 per share; and the last ten of the £100 shares for £1600, or £160 per share. The £137 10s. stock was sold for £221 7s. 6d., or at the rate of £161 per £100. Some years ago the original stock was offered by the company to the Town Commissioners in the negotiations to purchase, and was refused by them at £90—they declining the £100 stock at 4½ per cent. discount.

DOUGLAS (ISLE OF MAN) WATER SUPPLY.—The Douglas Water-Works Company held a meeting on the 1st inst., for the purpose of considering a proposal which has been made for the construction of an immense reservoir, capable of containing about 20 million gallons of water, for the supply of the town. A plan has been drawn up by Mr. D. Cregeen, C.E., for the construction of an immense retaining wall across the glen about five miles from Douglas, called the Clypse Valley. Mr. Cregeen estimates that by building the wall to a height of 30 feet the reservoir will hold about 10 million gallons, and the amount of water impounded can be greatly increased simply by raising the retaining wall, the glen itself forming a natural reservoir. The company will thus be in a position easily to supply the wants of the town. Owing to the natural formation of the ground, the cost of the work will be very little, Mr. Cregeen estimating that at the most it will not exceed £5000. The meeting, after a long discussion and examination of the plans, unanimously resolved to raise capital in order to carry out the proposed works.

FYLDE WATER-WORKS COMPANY.—The half-yearly meeting was held at Kirkham on the 8th inst.—Mr. Kemp in the chair. The directors, in their report, congratulated the shareholders on the continued increase in the revenue, and recommended a dividend for the eight months ending the 28th of February last (free of income-tax) at the rate of 6½ per cent. per annum on £75,000, the old subscribed capital; a like dividend on the sums received for deposit and calls on the 3000 £5 shares issued in May last for the eight months or from the time of payment to the 28th of February, and interest at 4½ per cent. per annum on the sums paid in advance of calls on the same shares for the same period. These payments amounted to £3765 6s. 11d., and left a balance to the credit of revenue of £592 14s. 3d. The directors recommended that of this balance £400 be placed to the credit of the reserve-fund, which could be thus increased to £2267 12s. 2d., and the rest carried forward to the next account. It was stated that all the works are in a satisfactory condition. The number of houses supplied with water is 4648, being an increase of 240 during the past eight months.

WAKEFIELD WATER-WORKS COMPANY.—An extraordinary meeting of shareholders was held on the 6th inst.—Mr. Slatter in the chair—when it was resolved to borrow £7500 on mortgage, in order to pay off some claims against the company, and to provide new filtering-beds. A long discussion took place in reference to the position of the company. The chairman stated that after much deliberation, the directors had agreed upon a scheme which they believed would be most remunerative, but at present they did not consider it would be prudent to enter into details with regard to it. He proposed a resolution to the effect that, in the opinion of the meeting, it was important and necessary for the interest of the company that a new supply should be obtained, and authorizing and empowering the directors to take all the necessary steps in the matter.—Alderman Howden seconded the motion. Some of the shareholders seemed strongly opposed to any action being taken in the matter for six or twelve months; others endeavoured to induce the directors to state where the proposed new source of supply was, whilst some were of opinion that the works ought to be in the hands of the corporation. Ultimately, on the directors promising to give the shareholders some information with regard to the new scheme at the next ordinary half-yearly meeting, in July or August, the motion was carried, with two dissentients.

LONDON GASLIGHT COMPANY.

The Ordinary Half-Yearly Meeting of Proprietors was held at the Freemason Tavern, Great Queen Street, Lincoln's Inn Fields, on Wednesday, the 14th inst.—MAJOR ROHDE HAWKINS, Esq. (the governor), in the chair.

The advertisement convening the meeting having been read by the SECRETARY (Mr. A. J. Dove), the following report and statements of account were presented:—

Annexed to this report your directors submit the half-yearly accounts, showing the result of the manufacture and distribution of gas up to the 31st of December, 1874.

The depression referred to in the last report has, to a great extent, passed away; for, although the return for coke and other products exhibits a falling off of £13,837 16s. 6d., as compared with the corresponding period of the previous year, the cost of coal has diminished to the extent of £20,471 14s. 4d., and the rental for gas shows an increase of £5813 16s. 8d.

The favourable result of the operations of the half year will thus enable the directors to restore to the reserve-fund an amount more than sufficient to replace that taken from it to meet the dividends payable in October last; and, after reserving £10,472 9s. 1d., the amount required for dividends on the preference capital, and appropriating £750 to the redemption-fund, in accordance with the provisions of the London Gaslight Act, 1857, the sum of £31,176 8s. 11d. remains applicable to dividend on the ordinary capital. Your directors, therefore, recommend that dividends be declared on all classes of preference stocks and shares at their respective rates, and at the rate of 10 per cent. per annum on the ordinary stock.

Three bills, having various objects in view with regard to the supply of gas to the metropolis, have been introduced this session into Parliament by the metropolitan authorities. Two of these bills have been withdrawn; but a third remains. The provisions of this bill are so unjust in themselves, and so opposed to the interests of the public, as well as to the principle of recent legislation, that your directors cannot believe that Parliament will pass it in its present shape.

In order to meet extensions of the works rendered necessary by the continued increase of business, the directors have made a call of £5 per share on class A, payable on the 31st of March. The produce of this call will be £15,830.

The retirement of Robert Henry Parkinson, Esq., who held a seat at the board for 25 years, greatly to the advantage of the company's interests during difficult times, having occasioned a vacancy on the direction, this has been filled by the election of Richard Henry Wyatt, Esq.

Three directors—namely, Major Rohde Hawkins, Esq., Juland Danvers, Esq., and Miles Miley, Esq.—retire by rotation, and, being eligible, offer themselves for re-election.

One auditor—namely, Jonathan Denny, Esq.—also retires by rotation, and, being eligible, offers himself for re-election.

No. 1.—STATEMENT OF STOCK AND SHARE CAPITAL, *on Dec.* 31, 1874.

Acts of Parliament relating to the Raising of Capital.	Description of Capital.	Maximum Dividend authorized.	Number of Shares issued.	Nominal Amount of Shares.	Called up per Share.	Total paid up.	Arrears of Calls.	Remaining to be called up and unissued.	Total Amount authorized.
15 Vict., cap. 82	Ordinary stock	10 per cent.	Stock	Stock	Stock	£381,800	..	..	£381,800
	2nd pref. „	6 ditto.*	Do.	Do.	Do.	11,800	..	..	11,800
	3rd ditto „	6 ditto.*	Do.	Do.	Do.	3,550	..	..	3,350
	1st ditto „	6 ditto.	Do.	Do.	Do.	130,000	..	..	150,000
29 Vict., cap. 55	A ditto shares	6 ditto.	7,622	£25 0 0	£15 0 0	158,650	..	£31,870 0 0 109,450 0 0	300,000
20 & 21 Vict., cap. 73	Debenture stks.	5 & 6 ditto.	Stock	Stock	Stock	26,750	..	..	26,750

* With option of conversion.

No. 2.—STATEMENT OF LOAN CAPITAL, *on Dec.* 31, 1874.

Acts of Parliament authorizing the Loan Capital.	Description of Loan.	Rates per Cent. of Interest.		Total Amount borrowed.	Remaining to be borrowed.	Total Amount authorized.
		4½ per cent.	5 per cent.			
15 Vict., cap. 82	Bond, &c.	£67,460	£75,332	£91,667	..	£91,667
29 Vict., cap. 55	Ditto			51,125	£36,732	100,000

No. 3.—CAPITAL ACCOUNT.

Dr.

To Expenditure, to June 30, 1874			£825,191 13 7
Ditto, during half year to Dec. 31, 1874—viz.:			
New buildings and machinery in extension of works	2,404 0 0		
New and additional mains and services	1,414 17 6		
Ditto ditto meters	528 6 11		
		4,347 4 5	
		£829,538 18 0	
Balance		10,700 15 0	
Total expenditure		£840,239 13 0	
Balance		35,133 2 0	
		£875,372 15 0	

Cr.

Description of Capital.	Certified Receipts to June 30, 1874.	Received since that date.	Total Receipts to Dec. 31, 1874.
By Ordinary stock	£378,350 0 0	*3,450 0 0	£381,800 0 0
2nd Preference ditto	14,450 0 0	†	11,800 0 0
3rd ditto ditto	4,350 0 0	‡	3,550 0 0
1st ditto ditto	150,000 0 0	..	150,000 0 0
A ditto shares, £25 each, including amount received in anticipation of calls	158,215 0 0	465 0 0	158,680 0 0
Debenture stocks, under 20 & 21 Vict., cap. 73	26,750 15 0	..	26,750 15 0
Bonds and other loans	141,192 0 0	1,600 0 0	142,792 0 0
Note † £2,650 converted into ord. stk.			
‡ 800 ditto.			
* £3,450	£873,307 15 0	..	£875,372 15 0

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—			
Coals, including dues, carriage, unloading, and trimming (see Statement No. 8)	£61,527 9 7		
Salaries of engineers, superintendents, and other officers at works	1,678 15 3		
Wages (carbonizing)	9,283 16 1		
Purification, including £857 0s. 3d. for labour	1,396 15 10		
Repairs and maintenance of works and plant, materials, and labour, less £869 9s. 11d. received for old materials	9,708 14 5		
		£83,595 11 2	
The Gaslight and Coke Company, for cannel gas		6,797 7 0	
Distribution of gas—			
Salaries and wages of officers (including rental clerks)	2,035 3 9		
Repairs, maintenance, and renewals of mains and service-pipes, including labour	1,800 19 2		
Repairs and renewals of meters	1,566 5 1		
		5,402 8 0	
Public lamps—			
Lighting and repairing		1,550 3 10	
Rents, rates, and taxes—			
Rents payable	904 2 0		
Rates and taxes	2,683 0 8		
		3,587 2 8	
Management—			
Directors allowance	900 0 0		
Company's auditors	75 0 0		
Salaries of secretary, accountant, and clerks	933 14 4		
Collectors commission	1,131 13 4		
Stationery and printing	268 14 1		
General charges	1,654 0 1		
		4,963 1 10	
Law charges		35 4 4	
Bad debts		808 1 1	
Depreciation-fund for works on leasehold land		100 0 0	
Superannuations, sick allowances, and gratuities		485 12 0	
Repairs of houses		103 3 3	
Total expenditure		£107,427 15 2	
Balance carried to net revenue account, No. 5		46,126 8 2	
		£153,554 3 4	

By Sale of gas—			
Common gas, per meter, at 3s. 9d. and 4s. 6d. per 1000 cubic feet		£100,770 3 5	
Cannel gas, per meter, at 5s. and 6s. per 1000 cubic feet		6,497 19 0	
Public lighting, and under contracts—			
Common gas	9,519 1 7		
Cannel gas	1,480 7 0		
(See Statement No. 10.)			
	118,267 11 0		
Rental of meters	1,932 7 3		
		£120,199 18 3	
Residual products—			
Coke, less £1644 9s. 11d. for labour and cartage	22,026 0 3		
Breeze, less £235 18s. 4d.	1,001 16 9		
Tar, less £33 2s. 9d.	5,234 1 5		
Ammoniacal liquor	3,760 8 8		
		32,022 7 1	
Rents receivable		1,394 0 6	
Transfer fees		7 17 6	
		£153,554 3 4	

No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

To Interest on bonds to Dec. 31, 1874	£3,342 11 7		
Dividends on preference capital	10,472 9 1		
		£13,815 0 8	
Interest on temporary loans		384 13 7	
Redemption-fund, reserve, per London Gaslight Act, 1857		750 0 0	
Balance applicable to dividend on ordinary capital		31,176 8 11	
		£46,126 8 2	

By Balance from last account		£8,448 4 0	
Amount brought from reserve-fund		10,469 6 9	
		£18,917 10 0	
Less dividend on ordinary capital for the half year ending June 30, 1874		18,917 10 0	
Amount from revenue account, No. 4			£46,126 8 2
			£46,126 8 2

No. 6.—RESERVE-FUND.

To Amount carried to profit and loss	£10,469	6	0	By Balance on June 30, 1874	£22,287	8	8
Balance on Dec. 31, 1874	12,174	14	4	Interest on amount invested	356	11	8
	£22,644	0	4		£22,644	0	4

No. 7.—DEPRECIATION-FUND (for Works on Leasehold Land).

To Balance on Dec. 31, 1874	£1,200	0	0	By Balance on June 30, 1874	£1,100	0	0
				Amount brought from revenue account for the half year ending Dec. 31, 1874	100	0	0
	£1,200	0	0		£1,200	0	0

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, June 30, 1874.	Received during the Half Year.	Carbonized during the Half Year.	Used for Sundries during the Half Year.	In Store, Dec. 31, 1874.
	Tons.	Tons.	Tons.	Tons.	Tons.
Common	15,300	42,480	52,649	26	5,105
Cannel	1,266	592	1,461	..	397

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

Description of Residual.	In Store, June 30, 1874.	Made during the Half Year. Estimated.	Used during the Half Year. Estimated.	Sold during the Half Year.	In Store, Dec. 31, 1874.
Coke, chaldrons of 36 bushels	2,353	51,537	10,677	41,598	1,615
Breeze, " "	867	7,410	854	5,767	1,656
Tar, gallons	78,000	539,028	..	527,028	90,000
Ammoniacal liquor, butts of 108 gallons	1,130	11,263	..	9,337	3,056

No. 10.—STATEMENT OF GAS MADE, SOLD, &c.

Description of Gas.	Quantity (measured by Station Meters).		Quantity Sold.			Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lamps.
	Made.	Purchased.	Public Lights and under Contracts (Estimated).	Private Lights (per Meter).	Total Quantity Sold.				
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	538,046	..	44,093	450,716	494,809	5,446	500,255	37,791	3,997
Cannel	..	29,661	4,775	21,902	26,677	1	26,678	2,983	834

BALANCE-SHEET.

To Capital—				By Cash at bankers, and in hand			£14,868 6 2
For balance, per account No. 3	£35,133	2	0	Amount invested—			
Net revenue—				Reserve-fund			11,818 2 8
For balance, per account No. 5	31,176	8	11	Stores on hand, viz.—			
Reserved fund—				Coals	£6,031 7 9		
For balance, per account No. 6	12,174	14	4	Coke and breeze	987 10 0		
Depreciation-fund (for works on leasehold land)—				Tar and ammoniacal liquor	1,836 15 9		
For balance, per account No. 7	1,200	0	0	Sundry stores	4,841 17 11		
Redemption-fund	1,176	13	0				13,697 11 5
Interest on bonds and other loans, for amount due to Dec. 31, 1874	1,918	13	10	Accounts due to the company—			
Preference dividends, ditto	10,472	9	1	Gas & meter rental, quarter ending Dec. 31, 1874	£75,535 0 5		
Unclaimed dividends	3,887	14	11	Ditto, arrears outstanding	1,334 17 10		
Sundry tradesmen and others, for amount due for coals, stores, and sundries	34,493	0	6		£76,869 18 3		
				For coke and other residual products	13,535 2 4		
				Sundries	903 15 9		
							91,308 16 4
	£131,632	16	7				£131,632 16 7

The GOVERNOR: Gentleman, I have now to move—"That the report of the directors and the accounts be received and adopted." Before asking you to ratify that motion, I have a few remarks to make. First of all, I have to say that the directors meet you to-day with more satisfaction in many ways than they did last half year. The last time we met we were obliged to take £10,000 from the reserve-fund to pay our dividends. On the present occasion, I am happy to say, we are not only able to pay our statutory dividends, but to place to the reserve-fund a sum of money more than equal to the sum we took from it last half year. The directors were not much alarmed when they had to make their statement as to the state of affairs last time, for they knew very well that it was more from the accident of the period of the year at which the accounts were made up than any other cause, that there was a deficiency—a fact which is confirmed by our accounts now presented; for we find that in the year 1874, taking the whole of the working, there was a profit of £2000 over and above what is necessary to pay the dividend of the year. So far, that is satisfactory, and, considering that the price of coal still kept up, it is quite as much as we expected to do. There is a notion abroad that when coal is dear, coke is dear, and that the one ought really to balance the other:—that the high price of coal ought not to influence the price of gas. But that is a mistake. We know from experience that they do not rise and fall simultaneously. And there is another point which is lost sight of—viz., that though a ton of coal will produce a chaldron of coke, about 20 per cent. of the coke that is made is required to be used in the manufacture of gas. Therefore, while we have so many thousand tons of coal to pay for, we have 20 per cent. less in quantity of coke for sale, and as the price of coal rises, the loss becomes proportionally greater. There is one other point I have to bring before you, that is, the question of the three bills introduced into Parliament this session, by the Metropolitan Board of Works and the corporation, on the subject of the supply of gas in London. You must have seen and heard so much about these bills that I need not detain you with any lengthened reference to them. They have been amply discussed at the meetings of other gas companies, so that it will not be necessary to go through them. I may just remind you that two of these bills have been withdrawn, and that the third, which was to have been read a second time last night, has been postponed for three weeks further. This shows to me that those in authority are not very anxious to push the matter forward, and I can only hope that the representations made to them have satisfied them that there is not so much reason for legislation as they supposed, and that, before proceeding further, it is desirable a little more light should be thrown upon the subject. The fact is, there are one or two clauses in the bill, as brought forward now, which are simply unjust. It is not a matter of merely regulating the companies, but of robbing the companies. For fifteen years the gas companies of London have been carried on under an Act of Parliament, which has recognized one great principle—that if the companies did a certain amount of work, that amount of work being dictated by the Legislature, they were entitled to make sufficient profit to pay their statutory dividends. And as that principle, enacted fifteen years ago, has been affirmed and re-affirmed in various shapes in several Acts of Parliament passed since, it certainly would be very unjust to attempt to interfere with the property of the shareholders to the extent indicated by this bill; and I think that, whatever the Metropolitan Board may like to do, the Legislature, under no circumstances, will consent to anything so manifestly unfair. There are other questions involved in the bill, but they are all matters of detail and regulation, which we shall fight bit by bit, for a great many of them are exceedingly unfair to the companies, and would be most injurious to the public. The simple effect of attempting to enforce unjust regulations would be ultimately to increase the price of gas to the consumers. I do not know that I need go into these matters now; they will be gone carefully into, when the time comes, in the committee of the House of Commons. I move that the report be adopted.

The DEPUTY-GOVERNOR (the Hon. A. Kinnaird, M.P.) seconded the motion.

Mr. DOANE: Are we individually, as a company, taking any steps to oppose the bill just referred to?

The GOVERNOR: We have united with the other companies in opposing it; there is a joint committee for the purpose.

Mr. DOANE: Does that committee include representatives from all the companies?

The GOVERNOR: It does not include the Chartered Company, because they have a bill of their own; nor the Commercial and Ratcliff, who are also promoting a bill for an amalgamation; but all the companies are actively employed in the opposition to the bill.

The motion was put and carried.

The GOVERNOR: I now move—"That the following dividends be declared, viz., the fixed dividends on all classes of preference stocks and shares, and a dividend at the rate of 10 per cent. per annum on the ordinary stock; such dividends to be payable on the 15th inst."

The DEPUTY-GOVERNOR seconded the motion, which was carried.

The retiring directors and auditor were severally re-elected.

The GOVERNOR next moved that the salary of the secretary be raised to £1000 per annum from the 1st of January last. He said: The directors are of opinion that Mr. Dove has served us long and faithfully, and that, looking at the salaries paid to other secretaries, we ought not to pay ours in an inferior degree. As Mr. Dove's services are exceedingly valuable to us, we do not think the salary now proposed to be paid to him is at all too much; on the contrary, it is what he is fully entitled to, and is as little as we ought to pay him. This is a question that has to be decided by the shareholders, but the recommendation is one which the directors wish to urge upon you as strongly as possible, as one which has their fullest concurrence.

The DEPUTY-GOVERNOR: I second the motion. I may mention that our late secretary enjoyed this salary, and I am sure that all those who have had experience of Mr. Dove's indefatigable services will agree in the recommendation now made by the board.

Mr. GOULD: I have no objection whatever to the proposed increase in Mr. Dove's salary. I have known him for many years, and am aware that he has been a very efficient officer of the company. At the same time, I think the shareholders should have had some little notice of the intention to bring forward this motion, and that we should not be called upon at the moment to carry this resolution. I think at any future time such a proposal should be put into

the report. At the same time, I repeat, I heartily coincide in the motion itself.

Mr. RAWLINSON: I may perhaps say to the shareholders present that the directors generally are hardly responsible for the manner in which this is done. It was proposed at one time that Mr. Dove's salary should rise progressively—I believe, up to the now intended fixed salary of £1000 per annum, and I then suggested that it should be done at once, knowing as I did the great services our secretary has rendered the company. The shareholders may take it for granted that the directors do consider, in every possible form, these questions of the increase of salaries, before they venture to carry such a resolution in their own body. The question of the secretary's salary is one for the decision of the shareholders, and I think it would be well if it could be done, but I do not know how, to give them notice beforehand.

Mr. GOULD: There is no objection in my mind to the amount; I think it is what Mr. Dove is entitled to. My only objection is to the proposition being made without notice. With these remarks I withdraw any opposition to it.

The GOVERNOR: The fact is, we have thought it desirable to go into the whole question of the salaries of the officers of the company, and amongst them, of course, was the salary of the secretary, respecting whom we decided that £1000 was the proper amount. And when we settled that question, we also settled the question of annual increment. But Mr. Dove had been so long with us, we thought it right to raise him at once to the maximum salary.

The notice was put and carried unanimously.

The SECRETARY: I beg to thank the directors in the first place—the Governor, Deputy-Governor, and Mr. Rawlinson—for the kind remarks they have made, and the kind feeling they have expressed towards me. I am very grateful to them for the way in which they have brought this question before the proprietors. I am thankful also to the proprietors for the gracious manner in which they have received the proposition. I am quite sure Mr. Gould had no feeling against me in the remarks he made, for he has always expressed on former occasions, as I believe he still entertains, the most friendly feelings towards me.

A vote of thanks was then given to the directors, and the CHAIRMAN having briefly acknowledged the same, the proceedings terminated.

LIVERPOOL GAS SUPPLY.

On Wednesday last a Meeting of the Special Committee of the Liverpool Town Council, appointed to consider the Gas Supply of the Borough, was held —Dr. CROSS in the chair.

Mr. ATKINSON (the deputy town-clerk) read the certificate of analyses made by Mr. Edward Davies of two bottles of gas received from the chairman. Twenty cubic feet of gas, taken off the 31st of January last, gave sulphur equal to 3·10 grains per 100 cubic feet; 20 cubic feet, taken off on Feb. 22nd, gave sulphur equal to 1·92 grains per 100 cubic feet. In reply to the chairman, he stated that the analyses proved the gas to be, as regarded sulphur, tolerably pure. He had not tested the two samples further than for sulphur. When the pressure was very great in the mains, consumers bills would be larger, as the gas would be forced through the burners more rapidly than it could be perfectly consumed.

The following report by Dr. J. Campbell Brown, the borough analyst, was next read:

Liverpool Royal Infirmary School of Medicine, March 30, 1875.

In compliance with instructions received from the borough engineer to test the purity of the gas supplied to the borough of Liverpool, on behalf of the Special Gas Committee, I beg to submit the following report:—

1. While the analyses of the gas were in progress, the illuminating power was taken in the manner prescribed by the Liverpool Gas Act, with the following results:—

1.	Illuminating power equal to	. . . . .	20·6	candles.
2.	,,	,, ,,	18·1	,,
3.	,,	,, ,,	19·87	,,
4.	,,	,, ,,	20·9	,,
5.	,,	,, ,,	21·25	,,
6.	,,	,, ,,	20·38	,,

I find that by choosing candles of higher illuminating power, the above figures are diminished in the ratio of 1·0 to 0·906; but, on the other hand, by choosing a burner which burns the gas more advantageously than that prescribed in the Liverpool Gas Act, and which was not known when that Act was passed, the illuminating power of the gas is increased in the ratio of 1·0 to 1·11.

I think that while the consumer is entitled to test the gas against the purest candles that can be obtained, the manufacturer is entitled to the use of the most advantageous burner for his gas which can be obtained by the public. Altering the above figures, so as to correspond with light from the best candles and the most advantageous burner, they become—

1. Equal to	20·72 candles.	4. Equal to	21·02 candles.
2. Equal to	18·202 ,,	5. Equal to	21·37 ,,
3. Equal to	19·98 ,,	6. Equal to	20·5 ,,

The mean is 20·298.

Thus it appears that the illuminating power of the gas at the times when its purity was being tested did not greatly differ from the standard prescribed by the Liverpool Gas Act.

2. On two occasions I found the quantity of ammonia to be 0·025 grains, and 0·09 grains per 100 cubic feet; and I satisfied myself on several occasions that the reaction to test-paper was the slightest that could be appreciated. The above proportions are very small, and it is so much the interest of the manufacturer to keep down the proportion of ammonia in gas, that I did not think it necessary to make any further estimations of ammonia. The above figures show the average amounts in the 24 hours on each occasion.

3. On two occasions I found the proportion of sulphur estimated by Letheby's process, as directed by the gas referees, to be 5·1 and 7·02 grains per 100 cubic feet. These figures are the average of 24 hours. Only a trace of the sulphur was in the form of sulphuretted hydrogen. The Gas Act only prescribes a test for sulphur in the form of sulphuretted hydrogen, and it is this form or similar forms of sulphur only which can be entirely removed by practical methods of purification on the large scale. But sulphur in any form is such an objectionable impurity in gas, and the manufacturer has so little direct interest in reducing the proportion of this impurity, that the quantity of sulphur in every form has been limited by the Metropolitan Gas Acts; and its estimation is one of the most important objects of the gas referees. The process of estimation adopted by the referees, and of which the results are given above, does not include the whole of the sulphur in the gas, and, what is still more objectionable, does not give a constant proportion of the whole, but the quantity of sulphur which escapes collection and estimation varies with the circumstances of rate, draught, &c., under which the experiment is conducted. I have, therefore, estimated the quantity of sulphur also by a method which includes more nearly the whole of the sulphur in every form present in the gas. In no case was the amount high. In one case I found the average of 24 hours to be 12·01 grains per 100 cubic feet; and I am, therefore, led to the conclusion that the Liverpool gas is satisfactorily pure, so far as sulphur is concerned. This freedom from sulphur arises from the method of purification employed by the Liverpool Gas Company—a method which is more efficient than any other in removing sulphur, and which removes all the sulphur in the form of sulphuretted hydrogen, or in equivalent forms, but does not remove carbonic acid.

4. At the time when most of the Gas Acts with which I am acquainted were passed, gas was purified by lime, which removes carbonic acid very perfectly, and sulphur not so perfectly; and hence it happens that the Acts generally prescribe a limit to the amount of sulphur, but do not, so far as I remember, prescribe a limit to the amount of carbonic acid gas (carbon dioxide). The effect of any proportion of carbonic acid in gas is not merely to diminish the illuminating power directly by replacing an equal bulk of illuminating gas—carbonic acid being an incombustible and non-illuminating gas—but, by diminishing the combustibility and heating power of the illuminating gas with which it is mixed, it diminishes the luminosity of the flame in a degree much more than proportional to the quantity of carbonic acid present. The other objections to the presence of carbonic acid are practically of no account. It is so much the interest of the manufacturer to reduce the proportion of carbonic acid as much as possible, and it is of so little interest to the consumer whether carbonic acid is present or not, so long as he receives gas of the prescribed illuminating power, that it might perhaps be considered unnecessary to include carbonic acid in the present report. But, on the other hand, it is evident that if carbonic acid is present in gas to any considerable extent, one of two things must happen—either the remainder of the gas being itself of standard power, the carbonic acid will reduce the illuminating power of the mixture below the standard; or the manufacturer, in order to maintain the standard illuminating power, must make richer gas than he would require to make if no carbonic acid were delivered along with it. This will affect the cost of the gas, and thus indirectly interest the consumer.

5. I have, therefore, estimated the proportion of carbonic acid on four occasions, and I necessarily estimated the sulphuretted hydrogen at the same time. It will be observed that the proportion of carbonic acid is given in volumes per cent., and not in grains per 100 cubic feet, as in the case of ammonia and sulphur.

Carbonic Acid Gas. Volumes per Cent.	Sulphuretted Hydrogen.
3·43	None.
0·35	Trace.
2·63	Trace.
2·18	Under 0·1.

The weight in grains per 100 cubic feet will be found nearly by multiplying the above figures by 816.

It would be very desirable to reduce the amount of carbonic acid at any rate to the lowest figure above quoted. It is quite possible and even easy to do this. The chief objection to lime as a purifier has been the nuisance which the spent lime occasioned when thrown out, owing to the sulphur compounds which it contained; but, when the sulphur has been already effectually removed, this objection would not hold; and it would be easy, and, I believe, economical also, to pass the gas, purified, as at present, through a single small lime-chamber before sending it into the gasholders. The cost would be trifling, the nuisance would be none, and the gas would be slightly decreased in bulk, but increased in illuminating power to more than a corresponding extent, and part, at least, of the causes of its variability would be removed.

J. CAMPBELL BROWN, D.Sc.

The CHAIRMAN, in answer to Mr. Peet, said the street-lamps were adjusted, by means of a governor tap, to burn 4 feet of gas per hour, no matter what the pressure was in the mains; but as to private houses and other places, the pressure was whatever pressure there was in the mains; and if it was 18-10ths, as it was one day at St. George's Hall, or 14-10ths, as he had frequently found it, it was far in excess of what, under ordinary circumstances, was required, and the gas bills must of necessity be larger. The pressure should be 6-10ths or 7-10ths. The pressure of 6-10ths was used by London gas referees.

Mr. PEET remarked that the governor tap of street-lamps must get corroded in course of time, and that would prevent the 4 feet of gas per hour being consumed.

Mr. D. HORTON, assistant-inspector of gas-meters, also said that great pressure in the mains necessitated larger bills for gas consumers. He had found the gas consumed in the public lamps below the standard of 20 candles. On the 5th of February last year it was as low as 13·85 candles. It began to improve in August, and went up to 20·82. On the 14th of August the illuminating power was equal to 19 candles. The public lamps were supposed to be supplied at a pressure of 5-10ths; he had often found the pressure to be 12-10ths and 14-10ths. He had received numerous complaints from consumers who could not make out how their bills were so large. He gave the results of tests made with burners taken from the public street lamps, to ascertain the quantity of gas they would burn per hour, and in very few cases would they burn 4 feet. On the 16th of July, 13 were tested, when only two burned 4 feet per hour, and 11 below that quantity. In another experiment made with 20 lamps, none of them burned 4 feet per hour.

Mr. GLOVER, an assistant in the gas-meter office of the corporation, who was formerly in the employ of the gas company, when his duties were to adjust the burners of the street-lamps, said his instructions in 1864 were to adjust them to burn 4 feet of gas per hour at a pressure of 5-10ths. At a pressure of 10-10ths they would burn 5 feet or 5½ feet per hour.

The committee then adjourned.

MANCHESTER (CORPORATION) NEW GAS-WORKS.

The adjourned debate, on the proposal of the Gas Committee to erect new gas-works near Philips Park, was resumed in the Town Council on Wednesday last—the MAYOR (Alderman King) presiding. The resolution before the council was that the report of the Gas Committee, and the recommendations therein contained, should be approved and adopted, and that the committee should be authorized to carry out their recommendations. To this an amendment was moved—"That in the opinion of the council it is not desirable to erect new gas-works within the city."

Alderman BOOTH opposed the scheme of the committee, believing that the proposed site was very treacherous, the land being undermined with coal pits.

Mr. ROBERTS maintained that the new works should be erected outside the city. One of the alleged objections to the Barton Moss site was that there were no houses there. In this and in all other respects, such as the disposal of gas tar, ammonia, and coke, the works, if erected at Barton Moss, would be in exactly the same position as the London gas-works at Beckton. He objected to the corporation being promoters of nuisances, and setting a bad example to the citizens. He did not believe that the cost of gas would be increased by the removal of the works outside Manchester. It had not done so in London, and why should it do so in Manchester? He hoped the council would pause before adopting the committee's scheme.

Alderman PATTESON said that after the experience of last winter he would not take the responsibility of voting against the committee's scheme.

Alderman BENNETT said on former occasions he had voted with the committee in favour of the Bradford Road site, which had appeared to him to be a suitable site; but when he saw the strong objections entertained by the people in the neighbourhood, and particularly by the inhabitants of New Cross ward, of Ardwick, and Beswick, he thought that they ought not to force these gas-works upon the people. If gas-works were not unhealthy, they were exceedingly unpleasant. He believed it would be the wiser course to remove the gas-works altogether out of the city, and, instead of having three gas-works under three managers at high salaries, as would be the case if the recommendation of the committee were carried out, to have all their gas-works on one site, and under one management. It would not be difficult to buy a large plot of land at some distance from the city for this purpose, and the site at Bradford Road could easily be disposed of for at least the money it cost.

Mr. GOLDSCHMIDT considered the proposal to have one gas-work was very unwise, for, in the case of any accident, such as an explosion or fire, the town would then be left without a supply of gas. If gas-works were placed at too great a distance from the town, there would be a difficulty in getting workmen who would be willing to walk long distances to and from their work. The experience of last winter showed the necessity of having their gas-works near the railway. If the council did not allow the Gas Committee to build on the site near Philips Park, they must throw the responsibility for any difficulties that occurred in connexion with the supply of gas upon the council.

Mr. C. STEWART opposed the scheme of the committee, and said that Sir Humphrey de Trafford's agents had written him, in reply to a question he asked, a letter from which it was clear that the Gas Committee had not fairly and reasonably endeavoured to ascertain whether another site on Barton Moss than that originally offered was available.

Mr. CROSTON defended the action of the committee, and said they had made every reasonable effort to obtain a site, and the only one they had been able to obtain, excepting that at Bradford Road, had been found to be objectionable.

The discussion was still further prolonged, and at its close,

Alderman LAMB replied. He said that, owing to such statements as Alderman Booth had made about the treacherous nature of the ground at Bradford, Mr. Lynde had been instructed to examine it; and he reported the ground most suitable for the gas-works, and he had also discovered a valuable bed of fire-clay. If a suitable site could be procured at Barton Moss, they could not erect the gas-works there, because the Bridgewater Trustees would require them to lay down their pipes on swivel bridges, which would be impossible.

A division was then taken, when there appeared, for the amendment, 26; against it, 30.

Mr. BRIGHT then moved, as a further amendment—"That this council, recognizing the necessity for an increased power of production of gas, recommend the extension of the works at present in existence in the city."

Mr. G. BOOTH seconded the amendment, in the belief that time would be afforded by it to enable the committee to select a better site outside the city.

Mr. ANDERTON said there was no possibility of extending the Rochdale Road works. They could not, even if it were possible to increase the number of retorts, get the amount of material necessary to work them. There was now, even in the summer months, extreme difficulty in getting all that was wanted to store for winter.

After some discussion, the amendment was put to the meeting, and rejected by a majority of six, 24 voting for, and 30 against it.

The original motion was put to the meeting, and declared carried.

ON ACCIDENTAL EXPLOSIONS.

By F. A. ABEL, F.R.S., President, Chemical Society.

The accidents in collieries have their parallel in domestic life, in coal gas explosions, which, though at first sight of comparatively small importance, if judged by the loss of life and property which they occasion, yet merit serious consideration on account of the great frequency of their occurrence, and the demonstration which they almost always afford of ignorance or culpable carelessness. Whether occasioned by defective gas-fittings or by want of care in dealing with the gas supply, the escape of gas in a confined space, in any but very small quantities, must speedily result in the production of an explosive gas mixture, by the rapidity with which the gas will diffuse itself through the atmospheric air surrounding the point of escape. The application of flame to such a mixture must inevitably result in an explosion, the destructive effect of which is regulated by the quantity of gas escaping, and the time which it has had to mix with the air.

The circumstance that the admixture of even minute quantities of coal gas with air can be at once detected by the unmistakable odour of the gas, should serve as a safeguard against accidents; unfortunately, however, thoughtlessness or want of knowledge frequently causes this very fact to lead to the opposite result. Escapes of gas in comparatively small quantities often occur at the point of union (generally by a ball and socket joint) of a hanging burner or chandelier with the gas-pipe, or at the telescope joint of such gas-fittings; the column of water required in the joints to confine the gas becoming very gradually reduced by evaporation. In such instances an explosive mixture will accumulate in the upper part of an apartment of which windows and doors are closed, while the air in the lower part will continue for a long time free from any dangerous admixture of gas; and instances are continually recorded in the public prints of the deliberate ignition of such explosive mixtures, by persons who, observing the smell of coal gas upon entering the room, proceed forthwith to search for the point of escape by means of a flame. It need scarcely be stated that such a test is a perfectly safe one in itself, and that if the acceptance of the warning given by the odour of gas in the lower part of the room were promptly followed by the simple precautionary operation of leaving open for some time all windows and doors, so as to afford ready ingress of fresh air, and thus speedily expel, or very largely dilute, the gas mixture, the leakage could be looked for with no risk of accident.

Gas explosions, generally of a serious nature, do occasionally occur through no fault of those who are the direct agents in bringing them about, as by a person entering with a light a closed apartment in which there has been a very considerable escape of gas for some time, or a building into which gas has been entering from a leakage in the supply-pipe or the main. A very sad accident of the latter kind occurred in January last at Durham, resulting in the death of two persons. The occupants of a house had noticed on a Saturday afternoon a smell of gas, which was traced to a leakage in the main-pipe by the gas company's servants, who stated that it could not be repaired until the following Monday. The man, being satisfied that the gas escape did not occur in his house, lighted a candle some time afterwards, with the result that a terrific explosion nearly wrecked the house, which had become, to a very considerable extent, filled with explosive gas mixture. In another recent instance, the accidental ignition of an explosive coal gas mixture issuing from a drain-pipe communicating to the sewer in which gas had leaked from the main, caused the demolition of one house and the partial demolition of another, the inmates, in both instances, escaping, fortunately, with bad injuries. The first of these accidents, at any rate, would not have occurred if prompt means had been taken for stopping the leakage when its source was discovered; and it may be confidently affirmed that a very large majority of the accidents resulting from coal gas explosions might be avoided by the exercise of ordinary care and intelligence.

The employment of illuminating agents closely allied to coal gas—namely, liquid carbo-hydrogen compounds obtained by the distillation of coal or shale, or derived as natural products from coal-bearing strata, gradually extended during the earlier part of the last quarter of a century until they became formidable rivals of mineral and vegetable oils, and even of gas itself. Among the very earliest of these so-called mineral oils was paraffin oil, first obtained from a particular description of schist or coal, by Mr. Young; but some time before then, the most volatile products obtained by the distillation of coal tar were employed in lamps without wicks, of such construction that the volatile liquid, flowing by gravitation from the reservoir to the source of heat, was converted into vapour as it reached the point where the jets of flame were produced. The great facility with which the more volatile portions of rock oil or petroleum, and of the products of distillation from coal and schist, were applicable as brilliant illuminating agents in lamps of simple, cheap, and convenient construction, combined with the low price at which they could be retailed, consequent upon the great development of the petroleum industry in America, soon led to their extensive employment by the general public, and the importation of these volatile oils or spirits attained in a short time a scale of considerable magnitude.

The several varieties of so-called petroleum spirit which are known as naphtha, benzine, benzoline, gasoline, japanner's spirit, &c., yield vapour more or less freely on exposure to air at ordinary atmospheric temperatures, and even in some cases below 50° Fahr. Their low specific gravity and volatility permit of their employment in very simple and inexpensive lamps—the commonest form now extensively used by the poorer classes all over the country being the "sponge lamp," in which a small strip of sponge or coarsely plaited wick serves the purpose of drawing the spirit up from the reservoir to the orifice, where it is vaporized and burned. Although much the largest proportion of the petroleum spirit employed is probably used in lamps of some form or other, there are additional important uses to which it is applied in large quantities—*e.g.*, as a detergent, by dyers, &c.; as a substitute for turpentine in paints and varnishes; as a means of imparting luminosity to non-luminous inflammable gas, or of rendering atmospheric air itself the vehicle for illumination by saturating it with benzoline vapour; as a solvent and purifying agent in connexion with the manufacture of artificial alizarine, &c.

The statistics of the imports into London and Liverpool during the last three years show a very considerable increase in the consumption of petroleum spirit, as will be seen from the following numbers:—

Barrels Imported.

	1872.	1873.	1874.
London	33,693	45,889	58,687
Liverpool	26,871	27,394	47,200

The imports of the less volatile and properly refined petroleum products, known generally as petroleum oil (also called kerosine, crystal oil, rock oil, astral oil, and, incorrectly, paraffin oil), which do not yield vapour below a temperature of 100° Fahr., have fluctuated considerably during the last six years, but have increased lately to about five-fold into London, and four-fold into Liverpool, of what they were in 1872, as shown by the following numbers:—

Barrels Imported.

	1872.	1873.	1874.
London	48,295	206,573	245,291
Liverpool	46,679	104,155	159,700

The so-called paraffin or petroleum lamp explosions, of which, in the earlier days of the employment of these illuminating agents, there were so many recorded in the newspapers, and of which one still hears occasionally, were, with very few exceptions, not correctly designated as explosions, and when they were so were not caused by the employment of the volatile oils or petroleum spirit. As these vaporize very freely at the slightly elevated temperature which a reservoir of a lamp soon attains, air is either entirely expelled from the latter by the vapour, or so diluted by it that the mixture is not explosive. If, therefore, flame can have access to vapour escaping from any opening in the reservoir near the wick, in a badly-constructed lamp, it will merely burn as it escapes. If a lamp charged with petroleum spirit be carried incautiously, or accidentally jerked so that the liquid is suddenly brought into contact with the warmer portion of the lamp, near the flame, a very rapid volatilization may thereby be caused, resulting in a considerable outburst of flame. In either case, a nervous person, holding the lamp at the time, may drop it in alarm, or the reservoir, if of glass, may be broken by the sudden burst of vapour and the resulting large flame; in such instances, the spirit will be scattered and at once inflamed, inflicting injuries more or less severe on the instigator of the accident, or setting fire to the premises.* A so-called petroleum lamp explosion which occurred, quite recently, at Gloucester, resulting in the death, from burns, of a woman, was evidently brought about by the cause last described.

If a petroleum oil which has been imperfectly refined, and which, therefore, contains some proportion of the very volatile products, or spirit, be employed in a lamp, a slight explosion may be caused by its yielding up a small amount of vapour at the temperature to which the reservoir becomes heated, and thus producing a feebly explosive mixture with the air in the latter, which may become ignited by the flame of the lamp. An explosion thus produced is not at all of violent character, being generally merely a feeble puff; it may, however, cause the cracking of the reservoir, and the consequent spilling and inflaming of the oil, and may at any rate lead to accident as already described, by the alarm which it occasions to nervous or ignorant persons.

There is no doubt whatever that a very considerable proportion of the accidents which occur to persons using petroleum lamps, are really traceable to the erroneous belief, which is still so very prevalent, in the explosive character of these liquids. The fact that they and their vapours are simply inflammable, and that the latter require to be mixed with a large volume of air before their ignition can be accompanied by explosive effects, is so slowly realized, that in public prints petroleum is still often spoken of as an explosive substance, although these very prints have recorded such events as the burning, in 1866, of warehouses at Bow containing 1000 barrels of petroleum, besides four barges laden with petroleum lying alongside the wharf, without any explosion; and the ignition at New Jersey (in August, 1874) of a petroleum tank in the Erie Railway Company's oil yard, and the consequent burning of 70,000 barrels of petroleum. The popular belief in the explosiveness of these simply inflammable liquids, contrasts strangely with the fact that many explosions have been brought about by the careless employment of candles, or other naked flames, in premises where the volatile varieties have been stored, or where the operation of transferring the liquid from one vessel to another for purposes of sale is carried on, the result being the ignition of the explosive mixture produced by the volatilization of the spirit and its diffusion through the air. This fact does indeed tend to discourage the hope that the proportion of accidental explosions of gunpowder, which are apparently due to ignorance, may become very greatly diminished by keeping its explosive properties before the minds of those using it.

Although those petroleum accidents, which are the results of carelessness or ignorance, are very difficult to attack, the community have unquestionably benefited very considerably in the matter of optional comparative security by the legislation of the last few years, in connexion with the storeage and sale of petroleum, imperfect though it still is. The prohibition of the sale of petroleum spirit of any kind, unless distinctly labelled so that the public may be alive to its specially dangerous nature as a very volatile liquid, and the limitation of its storeage and sale, by properly licensed persons, to localities specially selected and inspected by responsible officials, have most certainly contributed greatly to the protection of the public against accidents entailed by the use of these materials. A still more important benefit which has resulted from legislation on this subject, aided by the zealous action of the Petroleum Association, and of municipal authorities, is the almost complete exclusion from the market of such petroleum oil as yields inflammable vapour at temperatures considerably above the maximum atmospheric temperatures of Great Britain. The danger arising more especially from the transport and storeage of oils bearing names which apply to the properly refined, and, therefore, safe petroleum or coal oils, which do not demand special precautions for their safe storeage and use, and are, consequently, not subject to any restrictive or precautionary regulations, renders the application of the existing legal regulations to the inspection of petroleum oils imported into England of special importance. Such inspection, if efficiently conducted, must afford important protection to consumers and communities, by maintaining strictly the line of demarcation which it has been the object of legislation to establish between very volatile and therefore highly inflammable pretroleum or coal products, and those liquid hydrocarbons of the same origin which are comparatively very safe illuminating materials, because they do not evolve vapour at any temperature below about 100° Fahr. A thoroughly trustworthy and sufficiently simple method of testing the oils is essential to the attainment of this result; and after much consideration and practical experience had been brought to bear on this subject, the so-called flashing test, described in the Act of Parliament, was adopted as the fairest and most reliable one which could be prescribed for general application; but there is no doubt that, when applied to oils which nearly approach in their flashing point the limit prescribed by the Act, the operation of the test is not sufficiently sharp, nor the prescribed method of conducting it sufficiently rigid, to preclude the possibilty of its furnishing conflicting results in different hands, and thus leading to decisions, the justness of which may be legitimately open to dispute. It is, therefore, undoubtedly desirable, in the framing of any future Act, that this test should be

* The reports by Captain Shaw to the Metropolitan Board of Works, of the causes of fires in London, show a generally steady increase in the number of fires caused by lamps. Thus there were 20 in 1866, 30 in 1869, 49 in 1871, 56 in 1872, 47 in 1873, and 67 in 1874. These returns include fires from lamps of all kinds (many not defined); but it may be reasonably assumed, that three-fourths of the totals noted were caused by petroleum lamps. From one to seven fires annually are reported as caused by upsetting, "drawing off," or explosion of naphtha, paraffin, crystal oil, or petroleum. The proportion which fires from the above causes bear to fires caused by candles, is small, but has been on the increase in the last few years. From 1866 to 1870 inclusive, the fires caused by candles were from seven to ten times more numerous than those caused by lamps; but in 1872 they were only about five times; in 1872 and 1873, four times; and in 1874 only a little over three times more numerous.

carefully reconsidered, as well as the question whether some narrow limit below 100° Fahr. may not reasonably, and without incurring any increased risk, be fixed, within which the flashing point of an oil (*i.e.*, the temperature at which it evolves vapour) may range.*

Such accidents as the explosion of a mixture of petroleum vapour and air in a ship on the Thames (the *Maria Lee*), laden with about 300 barrels of petroleum and with other inflammable materials (in June, 1873), followed by her complete destruction by fire, in somewhat alarming proximity to the Purfleet powder magazines, and a similar accident in Glasgow Harbour, demonstrate the importance of the regulations which are imposed by the local harbour authorities, as directed by the existing Act of Parliament, upon all ships carrying petroleum spirit, with respect to their mooring and the landing of their cargo. The Act also gives to the municipal and other licensing authorities the very important power of including, as conditions of the licences, regulations with regard to the quantity of petroleum spirit to be stored in a particular locality; the nature and situation of the store with reference to inhabited buildings; the mode of storeage, and the nature of the other goods to be stored with it. Very efficient regulations have consequently been adopted by the Metropolitan Board of Works—and some other local governing authorities—with regard to the stores themselves, the exclusion of any source of fire or artificial light from them, the nature of the receptacles in which the petroleum is kept, &c. The latter is a point of the utmost importance, as specially affecting the risk of accident in storing and transporting petroleum spirit, and one which it is very necessary that legislation should deal with more specifically than is at present the case. The existing Act specifies that limited quantities, for sale or consumption, may be kept without a licence, provided they are contained in small vessels of glass, earthenware, or metal, but it is silent on the subject of the vessels in which larger quantities are to be stored, or with respect to any regulations conducive to safety in the transport of petroleum spirit. As regards the first point, it certainly gives ample power to the licensing authorities; but that legislation is urgently needed in regard to the second, was demonstrated by the recent fearful catastrophe on the Grand Junction Canal.

The liability of oil or spirit to leak from casks or barrels even of the best construction, consequent upon the rough usage to which these are unavoidably subjected when transferred from store to ship or carriage, and the reverse, need scarcely be pointed out. But even in the absence of leakage from the openings of the barrels, or from any accidental point of escape, evaporation or diffusion of the volatile petroleum will occur through the wood itself of which they are constructed, especially in the warm holds of ships or in stores exposed to the sun, even though the precautionary measure is frequently adopted of rinsing the barrel out before use with a solution of glue. It is evident that the object of imparting an impervious coating to the interior of the barrel can thus be only very imperfectly attained, and that, even if it were, the alternations of temperature to which the barrels must be exposed must in course of time open up places for escape by leakage or evaporation.

It is stated, on the authority of the manager of the extensive depôt for petroleum oil and spirit of the London Wharfing and Warehousing Company, at Plaistow, on the Thames, that in spite of the adoption of special arrangements for keeping down the temperature of the petroleum spirit stores, whereby it is made not to exceed 62° Fahr. in the very hottest weather, the loss of spirit by leakage and evaporation is very considerable, amounting to an average of 18 per cent. As the loss on petroleum oil from leakage at the same establishment amounts to about 9 per cent., it is evident that the limpidity and volatility of the spirit give rise to a loss as great again as that which is simply due to leakage from imperfectly closed vents or defects developed by rough usage.

The dangers resulting from the escape of petroleum spirit or its vapour from receptacles in which it is kept, in confined spaces, where little or no ventilation exists, has been but too frequently exemplified by explosions more or less violent, followed by fires in localities where it is stored or handled, or in the holds of vessels in which it is transported. Accidents of such kinds have been due either to carelessness in transferring petroleum from one vessel to another, in a shop or store in which a light has been burning at the time, or to a light being carried into, or a match struck, in a store where vapour has been escaping until it has formed an explosive mixture with the air. The explosion which occurred in a sewer at Greenwich last January, and was productive of much damage, was clearly traced to the entrance into the sewer of certain petroleum products (from a patent gas factory in the neighbourhood); the vapour from these had formed an explosive mixture with the air, which had become accidentally lighted, perhaps by the dropping of an inflamed pipe-light through one of the sewer gratings. The speaker has a vivid recollection of an accident of this kind which he witnessed at the Royal College of Chemistry, in 1847. Mr. C. B. Mansfield, who was then engaged in his important researches on the composition of coal tar naphtha, which led a few years afterwards to his sad untimely death, was engaged at one extremity of a low room (38 feet long, about 30 feet wide, and 10 feet high) in converting one of the most important of these product—benzol—(which boils at 176° Fahr.) into nitrobenzol in a capacious retort, which suddenly cracked, and, yielding to the pressure of its contents, allowed the warm liquid hydrocarbon to flow over the operating table. There was a gas-flame burning at the other extremity of the laboratory, and no other source of fire. Within a very few minutes after the fracture of the vessel, a sheet of flame flashed from the gas-flame along the upper part of the room, and communicated to the table upon which the liquid had been spilled.

The firing of the ship *Maria Lee*, just now referred to, was clearly proved to have been preceded by the explosion of a mixture of air and petroleum vapour, produced by leakage or evaporation from the barrels stored in the hold of the vessel. The weather was very hot at the time, and, there having been a heavy thunderstorm the night before the fire, the hatches had been kept closed and covered over with tarpaulin, so that there was no possibility of ventilation. The vapour gradually diffused itself through the air in the ship during the night, until the explosive mixture extended to the cabin at the after part. As the captain entered this cabin quite early in the morning (the immediate source of the fire was not clearly traced), a loud explosion occurred, and flame was immediately observed issuing from the fore part of the ship.

A similar explosion of petroleum vapour and air occurred not long since in a ship at Glasgow; and, lastly, it was established by a sound chain of circumstantial evidence, that the explosion of the powder-laden barge in the Regent's Park must have been caused by the ignition, in the cabin of the barge, of an explosive mixture of air and of the vapour of petroleum, derived from the leakage of certain packages of the spirit which were packed along with the powder. The description given by an eye-witness, on board a barge in front of the ill-fated *Tilbury*, of a bluish flash of flame, emanating from the cabin of the barge within a very brief period of the explosion, corresponds with the result produced when flame is applied to a mixture of hydrocarbon vapour with a large proportion of air. The manner in which the freight of the barge was enclosed by tarpaulins precluded ventilation, and was most favourable to the gradual diffusion of inflammable vapour, from even slight leakages in the barrels, through the confined air, until an explosive mixture extended to the opening in the bulk-head or partition, which in these barges separates the cabin from the hold.

It is impossible to protect heavy packages from rough usage, in the processes of unloading ships or other vehicles of conveyance; it is, therefore, most important that means should be adopted of thoroughly closing the vents of receptacles of petroleum spirit, by such means as are capable of sustaining ordinary rough usage without any injury to their efficiency, and that the improvement of the nature and construction of the receptacles themselves should be seriously considered, with the view of reducing the liability to accidents resulting from the escape of the spirit or its vapours, and the consequent creation of danger connected with the transport and storeage of these valuable illuminating materials.

The fact that combustible, and especially inflammable solid substances, if of sufficiently low specific gravity, and reduced to a sufficiently fine state of division to allow of their becoming and remaining for a time suspended in air, may furnish mixtures with the latter which partake of explosive character, scarcely needs to be pointed out. The ignition of a particle of such a substance, surrounded by atmospheric oxygen, will, under these conditions, at once communicate to others immediately adjacent to it; and if the particles of suspended solid matter be sufficiently numerous and finely divided, the ignition will spread throughout the mixture with a rapidity approaching that of a mixture of inflammable vapour and air, the development of gaseous products and heat being sufficiently rapid and considerable to produce explosive effects, which may even be of violent character, their violence being regulated by the nature and inflammability of the solid substance, the proportion and state of division in which it is distributed through the air, the quantity of the mixture, and the extent of its confinement.

Explosions of an accidental nature produced in this way are believed to have occurred in connexion with operations in the chemical laboratory; but it was scarcely to be expected that the first clearly authenticated cases of any importance should have arisen out of the apparently harmless operation of grinding corn.

That a mixture of very fine flour and air will ignite with a flash when light is applied to it, and produce, in a very mild form, the species of explosion observed on applying a light to lycopodium suspended in air, is not very difficult of demonstration; but it is not easy to realize the possibility of the production of violent explosive effects by the ignition of such a mixture, even upon a very large scale, though the rapidity of its ignition be accidentally favoured by the warmth of the atmosphere. Cotton-mills have been known to be rapidly fired by the ignition of cotton particles suspended in the air; but, compared with flour, cotton is very combustible. Flour, when absolutely dry, would contain only about half its weight of carbon, and about 6 per cent. of hydrogen, the remainder consisting of nitrogen and mineral substances; constituents which, by absorbing heat instead of contributing to its development, must tend to reduce the rapid combustibility of the substance. Yet the possibility of very serious calamities arising out of the accidental ignition of a mixture of flour-dust and air has been but too conclusively demonstrated.

On the 9th of July, 1872, the inhabitants of Glasgow were startled by an explosion which was heard to a considerable distance, and occurred in some very extensive steam flour-mills, of which the front and back walls were blown out, while the interior was reduced to ruins, and speedily enveloped in flame, destroying the remainder of the extensive buildings. Several persons were killed, and a number of others were severely burned, or injured by the fall of masonry. That the explosion was not occasioned by the steam-boilers employed as motive power in the mill was soon made clear; and by the evidence of persons employed in the mill at the time of the explosion, its origin was conclusively traced to the striking of fire by a pair of mill-stones, through the stopping of the "feed," or supply of grain to them, and the consequent friction of their bare surfaces against each other, the result being the ignition of the mixture of air and fine flour-dust surrounding the mill-stones.

This ignition alone would not suffice to develop any violent explosive effects: such ignitions, though occasionally observed in small mills, being caused either by the striking of fire by the stones, or by the incautious application of a light near the mill-stones, or the meal-spout attached thereto, have not in these instances been attended by any serious results. But in an extensive mill, where many pairs of stones may be at work at one time, each pair has a conduit attached to it, which leads to a common receptacle called an exhaust-box; into this the mixture of air and very fine flour-dust which surrounds the mill-stones is drawn, by means of an exhaust-fan, sometimes aided by a system of air-blowers. The fine flour is allowed to deposit partially in this chamber or exhaust-box, and the air then passes into a second chamber, called a stive-room, where a further quantity of dust is deposited. It follows that when the mill is at work, these chambers and the channels or spouts connecting them with the atmosphere immediately surrounding each mill-stone, are all filled with an inflammable mixture of the finest flour-dust and air, and that consequently the application of a light to any one of those channels, or the striking fire by any one of the mill-stones, by igniting some portion of the inflammable mixture, will result in the exceedingly rapid spread of flame throughout the confined spaces which are charged with it, and will thus develop an explosion. The violence of such explosions depends much upon details of construction of the exhaust-boxes and stive-rooms, and upon the dimensions of the channels of communication; it must obviously be regulated by the volume of inflammable mixture through which fire rapidly spreads, and upon the extent of its confinement. In the case of the catastrophe at Glasgow, the production of a blaze at a pair of mill-stones was observed to be followed by a crackling noise, as the flame rapidly spread through the conduits leading to the exhaust-box upon an upper floor, and a loud report from that direction was almost immediately heard. Professors Rankine and Macadam, who carefully investigated the cause of this accident, report that other flour-mill explosions which they have inquired into, had been observed to be attended by a similar succession of phenomena to those noticed upon this occasion. The bursting open of the exhaust-box by a similar, though less violent, explosion, attended by injury of workmen, the blowing out of windows and loosening of tiles, appears to have taken place on a previous occasion at these particular mills. In the last accident, however, the more violent explosion appears to have been followed by others, the flame having spread with great rapidity to distant parts of the mills, through the many channels of communication in which the air was charged with inflammable dust, resulting from the cleansing and sifting operations carried on in different parts of the building, and rapidly diffused through the air by the shock and blast of the first explosion.

The subject of flour-mill explosions, though it has attracted little, if any, attention in this country previous to the Tradeston explosion, is discussed in continental treatises on flour-mills, and the results of Messrs. Rankine and Macadam's inquiries have demonstrated that accidents of this kind are actually of ordinary occurrence in mills, especially since the introduction of the exhaust arrangements. Those gentlemen point out that it appears scarcely possible to guard against such accidents altogether, although the frequency of their occurrence may probably be much reduced by adopting efficient precautions to prevent, as far as possible, a stoppage of the "feed" to the mill-stones, or the accidental introduction of nails between them together with the grain, and by prohibiting the employment of naked lights in the vicinity of the mills and the dust passages. In order to reduce, as far as possible, the damage and risk of sacrifice of life resulting from such explosions, it is important that all receptacles into which the dust-laden air is drawn from the mills, should be fixed outside the buildings, and constructed so as to offer as little resistance as possible to the sudden expansion resulting from the ignition of the inflammable

* As the law at present stands, an oil, the flashing point of which is declared to be 99° by the official inspector, must be condemned; but another operator may make the flashing point of the same oil to be slightly above 100°. Practically, an oil with a flashing point of 97° or 98° would be quite as safe as one which answers to the test at 100°, in the hands of the same operator.

mixture. The conduits leading from the mills to the exhaust-chambers should, moreover, be of small dimensions, and there should be no other communication between the interior of the building and the dust receptacles, which must not be opened while the mill is at work. By adopting precautions of this kind, the millowner may succeed, at any rate, in reducing the mischief resulting from an accidental ignition of flour-dust at the mill-stones to such limits that the mill itself, and the lives of those engaged in it, will not be endangered.

The production of explosions by mixtures of air with marsh gas, coal gas, petroleum vapours, or a finely divided inflammable solid, such as flour, has been shown to be due to the application of sufficient heat to some portion of the mixture to cause the atmospheric oxygen to combine with the combustible constituents of the gas, vapour or solid, the results being the development of chemical action, the formation of gaseous products, and their expansion by the heat developed. It need scarcely be said that the same explanation applies to the production of explosions by that class of so-called explosive agents which is prepared by intimately mixing combustible or inflammable solids with a solid oxidizing agent (*i. e.*, an oxygen compound which readily yields up a part or the whole of that gas under the influence of heat, and, with the co-operation of chemical force, to carbon, hydrogen, or other readily oxidizable elements.) Distinct from these explosive mixtures, as regards their nature, but quite analogous to them in their behaviour and the effects they produce when subjected to heat or other disturbing influences, are explosive compounds. The majority of these contain carbon, hydrogen, and oxygen as the most important components; they are more or less susceptible of sudden or extremely rapid transformation into gases or vapours, attended by development of great heat, in consequence either of their resolution into their elementary constituents, or, generally, of the rearrangement of these into comparatively simple forms of combination. Some of these explosive compounds are of such unstable character, that they are liable to undergo change from very slight inciting causes, such as the existence in them of minute quantities of foreign substances of active chemical character; or they may even be prone to absolutely spontaneous change. In such substances decomposition may be in the first instance established only to a very minute extent; but this decomposition, by the products to which it gives rise, and by the attendant development of heat, however small, may speedily promote further and more rapid change in the mass of the substance, so that eventually decomposition of violent nature may be established, and the principal portion of the compound may suddenly undergo the same transformation into gases or vapours, attended by the same development of heat, as though any one of the agencies (*i. e.*, fire, friction, or percussion) ordinarily employed to determine the explosion of these bodies had been applied. Cases of so-called spontaneous explosion thus brought about are more familiar to scientific and manufacturing chemists than to the general public; but accidental explosions of very alarming and, in a few instances, of very calamitous character, are on record, which, though not actually of spontaneous nature, in the strict application of the term, have been brought about without any apparent application of external inciting agencies, and have hence, from a practical point of view, not been incorrectly classed as spontaneous explosions.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There has not been any material change at the blast-furnaces during the week. A pretty good tonnage of ironstone and ore from Lincolnshire and Northamptonshire is still coming to hand for combined use; the Lincolnshire ore, as is well known, acts as a good flux for the other kind just named. A common class of pig iron is obtainable at £3 2s. 6d. to £3 5s. per ton, the price varying between those limits according to the quantity taken. A better quality sells at £3 7s. 6d. to £3 10s. The demand at present is chiefly for foundry numbers, the local foundries being on the whole much better employed than the forges. The weakness of Scotch prices is a turn in favour of the founders, many of whom still use Gartsherrie, and other favourite special brands, for their best productions, in admixture with other kinds of pig. Cleveland quotations are now as under:—No. 1 foundry, 63s.; No. 2 foundry, 61s.; No. 3 foundry, 58s.; No. 4 foundry, 56s.; No. 4 forge, grey, 56s.; No. 5 forge, mottled, 55s.; No. 6 forge, white, 53s.; refined metal, 77s.; Kentledge, 65s.; and cinder pig, 44s., all per ton.

The local ironworkers wages are being lowered to the extent of about 2½ per cent., a fact which affords a little relief to the ironmasters. Still, however, puddlers wages here rule higher than the rate of payment accorded to the same class of men in the Cleveland district.

The coal trade remains in a quiet condition in almost every branch. The members of the Steam Coalowners Association met at Barnsley, on Friday afternoon last, in order to consider the state of the market, and the general question of prices. After some discussion, the meeting decided that it was not advisable to lower quotations at all, and that, if such a necessity arose, some of the pits should be closed rather than reduce prices. South Yorkshire best hard steam coal is now quoted at 12s. 6d. per ton to ordinary customers and for export, but large buyers, such as the railway companies, are supplied at 12s. per ton. It may be stated that ordinary manufacturing fuel is readily obtainable at 6s. 6d. to 9s. per ton, while common engine slack does not realize more than 3s. 6d. to 5s. per ton.

A conference has been held between a number of coalowners and representatives from the Colliery Topmens Association, as to the proposed reduction of 7½ per cent. in wages. A delegate meeting of the men's representatives has also been held, and a committee appointed to arrange the matter with the employers.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Encouraged in the hope of a reduction, at no distant date, afforded by the slight concessions in the price of bars just made by the Sheffield and Yorkshire firms, buyers in this district continue to hold back their specifications, and notwithstanding the orders distributed on quarter-day, makers are still eager to secure them.

Very few firms have more than a fortnight's orders on their books, and in most cases production is being considerably curtailed. Sheets of the best class are in most prominent inquiry, though in no department of the trade is there anything like activity.

Inferior qualities of finished iron of all classes are extremely dull of sale, and undersselling is consequently increasing. Unmarked bars are now changing hands at £8 15s. per ton, while three months ago they were quoted at £9 2s. 6d., and branded bars of well-known makes which still rule £10 10s. to £11 12s. 6d., have not receded a fraction during the interval. Common sheets are this week rather easier, but no appreciable reduction can be expected until the prices of coal have been revised.

The pig iron market is quiet, but steady, notwithstanding that stocks are accumulating, and producers declare that until some relief in first cost is obtained they cannot hope to check the growing competition of South Yorkshire and other neighbouring districts.

The prospects of the wrought tube trade at Wednesbury are still far from cheering. Although the recent labour dispute has been amicably concluded, many of the operatives are unable to obtain employment, owing to the slackness of trade in this branch of industry, the restricted demand being chiefly due to the severity of foreign competition.

The coal trade is without noteworthy alteration. The best qualities continue in moderate demand, but inferior descriptions are pressed for sale, and fine slack is quite a drug. The disinclination of the associated masters to revise wages or prices is attributed to the present unsatisfactory condition of the labour market. Many of the men, it is asserted, have gone to other districts, where a more remunerative scale of wages is in force, and there is consequently a scarcity of miners in this locality, which is felt more especially on the Dudley side of the district. At Cannock Chase there is now a decided falling off in the demand for household qualities, and a restriction of the output is in contemplation at some of the most extensive collieries. Prices, except for the common qualities of fuel, are still firm.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The fine weather is beginning to tell upon the house coal trade, but prices in the Manchester market are still very steady for good classes of fuel. There is, however, an increasing competition for orders for inferior classes of burgy and slack, and prices are decidedly weaker. The leading firms have not yet made any move, but a definite reduction in prices at the end of this month is now considered probable.

As I anticipated a short time ago, the colliery proprietors in the Oldham, Ashton, and Denton districts have found it necessary to meet the competition from other quarters by making a definite reduction in the local pit prices, and these have now been reduced from 10d. to 1s. 8d. per ton. This is to be followed by a reduction in wages. The adjourned meeting of the masters to consider the matter was held in Manchester on Tuesday last, and representatives of the men were also present. It was then agreed that the reduction should be made on the compounding system, and this it is expected will amount to something like 10 or 12½ per cent.

There is not much alteration to notice in the gas coal trade. It is, of course, too early in the season for any important orders for next year's supplies to be placed, but there are a fair number of inquiries on hand, which would seem to indicate that a tolerably good business will be done in this branch.

The steam coal trade is exceedingly quiet, and at the Liverpool and Garston ports considerable reductions in price have been found necessary, common qualities having, in some cases, fallen as much as 2s. to 3s. per ton, and better classes 1s. to 1s. 6d. per ton.

Coke continues in steady demand, the local supply and requirements being about equal.

Active preparations are being made to ensure the success of the autumnal visit of the Iron and Steel Institute of Great Britain to Manchester, and the local members have been formed into a committee to make the necessary arrangements for the meeting.

The iron market remains without much change. Nominally, list prices are unaltered, but the selling prices are exceedingly irregular. Consumers will only buy for pressing requirements, as they seem to think that there must be a reduction in the course of a few weeks. No. 3 Middlesbrough pig iron, for prompt delivery in the Manchester district, is quoted at 66s. 9d. per ton; No 4, 65s. 9d.; and No. 4a forge, 64s. 9d. per ton, and 1s. less for delivery over the next few months. Middlesbrough manufactured iron in this market is a little easier, and for good specifications 2s. 6d. to 2s. per ton under list prices is readily obtained. Bars are worth about £8 2s. 6d. per ton delivered; angles, £8 17s. 6d.; plates, £9 10s.; and rails about the same as last quoted.

The local finished iron-works are moderately well off for orders to the end of this month, but they are not fully employed. For builders castings there is a demand, and founders in this branch are fairly busy, but general founders are exceedingly quiet.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North of England was again tolerably firm last week. There was an abundance of tonnage, and a large arrival of foreign ships in the coal ports. A considerable quantity of gas coals were shipped coastwise and to the Continent. Prices for best qualities were extremely firm. Nominally, they were from 11s. 6d. to 12s. per ton. But actually the best qualities of gas coals will average about 11s. per ton, less 2½ per cent. discount. Second qualities may be quoted at from 9s. 6d. to 10s. per ton, with the same discount. Steam coals are likewise in fair request, and best qualities could not be had under the quoted rates of from 15s. to 16s. per ton, with good shipments abroad. There is a strike amongst the colliery mechanics—blacksmiths and the like—employed at the Northumberland collieries. They refuse to fall in with the award made by Mr. Rupert Kettle, who recently decided the rate of pitmen's wages. Mechanics are not a very numerous body of those employed about the collieries, but the pits cannot get on well without them, and the ordinary work at the mines is likely to be a good deal incommoded until they are settled with. That will not be long, as the coalowners cannot afford to have their trade stopped for any length of time at this season of the year. The wages arbitration in the Durham district was commenced in Newcastle this last week. The Right Hon. W. E. Foster, M.P., is the umpire. The arbitration takes in the case of the coke burners as well as the miners, so that the award will clear all trade disputes in the mining districts of Durham out of the way. The Monkwearmouth pitmen, after remaining out on strike for three weeks against non-union men, have returned to work without accomplishing their object. The coke trade in the county of Durham is busy, but the manufacturing coal trade makes very slow progress towards profitable business.

Nearly all classes of coasting freights were lower last week, and as there was an abundance of tonnage to hand there was a slight fall in continental freights.

At present there are large shipments of fire-clay goods, usually needed by gas-works, for the North of France. The fire-clay goods trade generally is busy, with a number of orders on hand.

Last week the Cleveland pig iron market was flatter, and prices fell. No. 3 Cleveland pig was quoted at 56s. 6d. per ton, and other qualities were sold at proportionate rates. There was no alteration reported in the condition of the finished iron trade. Most of the works are fairly occupied. The engine factories and iron shipbuilders are doing a moderate business.

There were rather large sales of chemicals on 'Change in Newcastle last week, but prices have hardly reached that point to make them very payable to the manufacturers. The shipments of chemicals have been very good, and it is hoped that this trade is gradually working itself out from its long period of depression and bad trade.

In the freight market at Newcastle, on Saturday, 6s. to 6s. 3d. per ton were the rates offered to small sailing vessels to discharge coal at the wharves in London rivers. Quotations to the North of France were from £8 10s. to £9 10s.; English Channel ports, £8 to £8 10s.; Irish ports, £9 10s. to £12 per keel, to load coals in the Tyne. Loading turns were from five to twelve days.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The "gas question" at present, in Scotland, is in a rather curious condition. The grumbling about the gas accounts, and the quality of the gas supplied, has, for the time, ceased in a great measure to let itself be heard, partly from the circumstance that the consumption of gas has greatly diminished in consequence of the lengthening of the days, and on account, also, of the fact that in a number of instances where the price has not already been reduced, there will be a reduction next month. In some places, however, the reduction in price will not come into operation for several months. At present, likewise, gas companies

are in very many cases making their contracts for the coal required during the ensuing twelve months, and some have not mentioned what reductions they will make in their charges until they learn what are the lowest terms on which they can secure the necessary supplies of coal.

In several places the late high prices for gas have stimulated persons to organize active opposition to the gas companies already existing, with the view of getting lower prices; and the opposition has gone the length of the formation of new companies, all of which are at present in a somewhat embryonic condition. The latest new gas company is one that has been announced at Uddingston, a village about eight or nine miles from Glasgow, where many Glasgow merchants and other well-to-do people have their residences. It is to be called the Uddingston, Bothwell, and District Consumers Gaslight Company, Limited, the capital being £8000, in 8000 shares of £1 each.

On Friday week a meeting of the directors of the Stirling Gas Company was held. Mention was made of the regret felt at the death of their most faithful and highly respected secretary, Mr. Davidson, and after expressing condolence with the deceased gentleman's widow, the meeting unanimously agreeed to appoint Mr. J. T. Wingate, solicitor, in his stead. The directors also resolved to reduce the price of gas from 5s. 5d. to 4s. 7d. per 1000 cubic feet, the reduction to take place from and after the survey of the meters in May next.

The announcement that the Inverness Gas and Water Bill had passed the Committee of the House of Lords was received on Tuesday evening with great satisfaction by the people interested in its success; indeed, when the telegram announcing the fact arrived in Inverness the town bells were at once set a-ringing by order of the magistrates. A meeting of the Town Council was also hastily summoned by Bailie Macbean, the acting chief magistrate. After the official telegram was read announcing that the Highland Railway Company's opposition had been totally defeated, there were loud cheers, and several members of the council spoke on the subject. Thereafter, a statement was made by Bailie Macbean to a large crowd of people that had gathered in front of the Exchange, and loud and long-continued cheering followed. The opposition of the railway company had reference chiefly to the question of water supply charges.

On account of the difficulty referred to in last week's report regarding the Kilmarnock Water Company's bill, the corporation of the town have resolved to give it the most vigorous opposition in the House of Lords. In the meantime, however, the company have repudiated entirely any breach of faith with the Town Council, and have expressed regret at the prospective opposition. At the same time they have given orders for any concessions to be withdrawn that were made to the Town Council during the progress of the negotiations.

There is now a very decided feeling in favour of the water supply of Rothesay being taken over by the Town Council of that Royal Burgh. Mr. Gale, engineer to the Glasgow Corporation Water Commissioners, has been asked to report professionally upon the condition and value of the works on behalf of the Town Council. The Dunoon Water-works are now rapidly approaching completion; indeed, Messrs. Baird, the contractors, have recently had the pipes so thoroughly scoured that those householders who had their connexions made between their houses and the mains had the pleasure of a copious supply of excellent water last Monday. At Kilmalcolme, which is a large village on the high-level line of railway between Glasgow and Greenock, active measures are in progress for getting a good and abundant supply of water. So far as they have been approached, the owners of the land are favourable, and it is anticipated that on a very early date a comprehensive scheme will be devised and carried out.

The Wishaw Police Commissioners had the water question under consideration at their meeting held last Monday. A report was read which bore that the consumption had reached 210,000 gallons per day. The population is estimated at 15,000, in which case the consumption is 14 gallons per head per day. Various recommendations from the Water Committee were considered. Considerable progress is making on the same question in the adjoining burgh of Mortherwell. At the last meeting of the commissioners it was reported that terms had been made with the owners of the lands on which the proposed water-works were to be constructed, and that the engineer might commence operations without delay. The rate for the ground is £10 per acre, and it was stated that the burgh would most likely be able to get the scheme carried out at an assessment of from 1s. to 1s. 6d. per pound, and in about fifteen months hence.

The Police Commissioners of Millport have contracted with Messrs. Thomas Edington and Sons, Phœnix Foundry, to supply a number of 9 and 12 inch pipes for the extension of the main sewers into the sea; and the Glasgow Police Board are asking for tenders for the supply of street gratings, man-holes, covers, &c.

Since last report iron has fallen in price still further. All the special brands of makers iron have been reduced from 2s. to 4s. per ton, and on Friday afternoon the week's business closed with the prices of warrants down as low as from 67s. 9d. to 67s. 6d. and 67s. 3d.

The coal trade in the West of Scotland is very dull, but in Fifeshire a more favourable aspect is showing itself, but chiefly in the shipping department. A great number of vessels have arrived at Burntisland and Tayport during the week, and are now waiting for cargoes for home and foreign ports. Contracts have been reported at 8s. free on board at Burntisland, and 9s. to 9s. 3d. at Tayport.

Birmingham Water Supply.—Dr. Hill, the medical officer of health for Birmingham, in his March report, says that the analyzed sample of the water supplied to that town contained suspended particles, and a piece of water-weed half an inch long.

Glasgow Water Supply.—Professor Bischof, of the Andersonian University, reporting on the Loch Katrine water supplied to Glasgow during March, states that, although yellowish, and containing much suspended matter, it was quite free from previous sewage contamination.

Barnstaple Gas Company.—The directors of this company have made a call of £2 per share upon the new shares in that undertaking. The additional capital is required to pay the cost of expensive alterations and improvements which have been, and are, going on at the company's works.

Misuse of Water at Manchester.—Six persons were brought before the Water-Works Committee on Monday week for offences against the Water-Works Acts, of whom two were fined for connecting without permission, two for obtaining water illegally, one for fixing irregular fittings, and one agreed to pay for water for the future.

Institution of Civil Engineers.—At the meeting of this society on the 6th inst., 23 candidates were elected, amongst whom were Messrs. W. Crabtree, borough surveyor of Southport; G. D. Harrison, engineer to the Staffordshire Potteries Water-Works; E. J. R. Kern, resident engineer of the Poltava Water-Works, Russia; and J. Mitchell, jun., engineer to the Worsborough Local Board.

Gas Explosion at Leith.—A disastrous explosion of gas occurred at a public lamp at the foot of Leith Walk, about eight o'clock on Saturday evening, as a lamplighter was lighting the jet. So violent was the explosion that the lamp and lighter were blown into the air. The lamplighter escaped with few injuries, but a number of children were struck by the pieces of broken lamp-post. One of them, James Allen, four years old, was killed; another boy received a dangerous scalp wound, and a girl named Helen Cameron is scarcely expected to recover. Parts of the lamp-post were driven a distance of 70 or 80 yards.

Chiltern Hills Spring Water Company.—The ordinary meeting of this company was held on the 30th ult., at Kingsbury, Aylesbury—Mr. H. A. P. Cooper in the chair. The accounts presented showed that the profits of the past year were £855, a sum more than sufficient to pay a dividend on the ordinary share capital. The directors, however, recommended that no dividend be paid, but that the costs of making the additional adits be defrayed out of this sum, and thus save the company the necessity of raising additional capital at the present time.

Maidstone Water-Works.—An accident occurred at these works on Wednesday last, by which the supply of the town was interrupted for two or three days. It appears that the company have two engines, in order to provide for contingencies. One of them had been repaired and at work three weeks, and was working admirably. The other one was to be put in thorough working order, but while this was being done, the beam of the engine at work suddenly snapped. Fortunately the necessary repairs were so far complete that one engine was set to work again on Friday afternoon.

Sewage of Paris.—It is stated in a communication from Paris that a commission, which was some time ago appointed by the Government to inquire into the best means of getting rid of the sewage of the city without polluting the Seine, has made a report of a very decisive character. The committee proposes that the whole of the sewage shall be distributed by means of machinery over a plain many thousand acres in extent. The value of this land, on which fruit and vegetables are produced for the Paris market, will, it is calculated, be thereby increased tenfold. At the same time no deleterious effects will result, the porous nature of the ground being specially favourable to the operation proposed.

Fenton Gas Supply.—At the meeting of the Fenton Local Board, on the 7th inst., Mr. Green proposed a resolution with reference to the purchase by the board of that portion of the Stoke Gas-Works which belonged to Fenton. In doing do, he remarked that he thought as Stoke was making negotiations for the purchase of the gas-works, it was quite time the board did the same with respect to that portion referring to Fenton. Mr. Minks seconded the motion. Mr. Wileman asked permission to add to the resolution, that their clerk be instructed to write to the secretary of the gas company, asking whether the company would be willing to sell their works, and at what price. It had been said that the whole of the works, including that portion which belonged to Fenton, had been offered to Stoke for purchase, but it was evident that Stoke could not purchase the whole against their wish. The resolution, with Mr. Wileman's alteration, was agreed to.

Explosion of Gas at Bolton.—Shortly before eight last Thursday evening an explosion of gas occurred at Brandwood's Commercial Hotel, Town Hall Square, Bolton. Some gas men had been at work upon the premises during the day, and after they had left, a strong smell of gas was perceived. A light was procured with a view to ascertain where the leakage was, when a large quantity of gas, which had accumulated under the floor of the dining-room, exploded with tremendous force. Nearly the whole of the windows in the hotel were shattered. The ceilings of the vault and staircase were stripped, and other rooms damaged. A large number of glasses were broken, the flooring of the dining-room was blown up, and the furniture scattered about. Several commercial travellers were on the premises at the time, and, as the staircase was speedily filled with smoke, the fire-escape was sent for to enable them to descend. Fortunately, however, there was no fire to cause alarm. Mrs. Brandwood was cut about the head by the falling plaster, and her husband and son were much shaken. The damage done is not so large as might be expected, and is covered by insurance.

Register of New Patents.

2692.—Rigby, J. and J., Manchester, "*Improved apparatus for lighting and ventilating.*" Patent dated Aug. 4, 1874.

This apparatus, relating to sunlights, is intended to increase the ventilating power of such lights at the same time that it decreases the heat produced in the ventilating-pipe to a very considerable degree, and thus reduces to a minimum the danger of fire produced by overheating. The light produced is at the same time improved in steadiness and brilliancy.

The inverted cup or reflector over the sunlight burner is attached to the lower extremity of a tube which tapers upwards, and the upper and smaller end of this tube is placed within the trumpet or funnel-shaped mouth of a second tube rather larger in diameter, so that a current of air is drawn in between the upper end of the first tube and the lower end of the second. The upper end of the latter is also similarly inserted into the trumpet or funnel-shaped mouth of a third tube still larger in diameter, so that a second current of air is drawn in all round, thus increasing the ventilation. These two currents of air being drawn into the tube will very greatly diminish the heat.

The third tube may either terminate just above the ceilling or it may be carried to the outside, but in either case there is an opening in the ceiling all round it, forming the mouth of an earthenware pipe of larger diameter which is the main ventilating-pipe, and a third current of air is drawn through this opening round the inner pipe. This earthenware pipe, which forms the exterior casing, is also further protected by one or more coatings of a non-conducting cement, and is the only part that can come into contact with any portion of the woodwork of the building. The steady draught which is caused by this arrangement, at the same time that it effects a most perfect ventilation of the apartment, and carries off all the carbon, increases the brilliancy and steadiness of the light.

In some cases where the sunlight is very large, and consequently the heat produced is very great, a second earthenware pipe of still larger diameter may be used, and where the sunlight is a considerable distance below the ceiling, more than three vertical pipes may be employed.

2694.—Aldous, E., Peckham, Surrey, "*A new or improved apparatus for preventing the waste of water in cisterns, tanks, and such like receptacles.*" Provisional protection only obtained. Dated Aug. 4, 1874.

This invention consists of a valve or block and box on the telescope principle or action, which is worked by floatation, and is for use in tanks or cisterns of any size, to cut the water off when the cistern or tank is full, and prevent the waste of water by overflow.

2698.—Clayden, S., Faringdon, Berks, "*A new or improved compound regulating governor gas-generator.*" Patent dated Aug. 4, 1874.

This invention has for its object the manufacture of a gas suitable for heating, cooking, and illuminating purposes, from light hydrocarbon oils, and its special object is from one machine to make and use at one and the same time, as may be desired, gas of different degrees of illuminating power.

To construct the machine, two tin or iron vessels are made, if for a 10-light burner, of the following proportions (or if for a larger or smaller number a proportionately smaller or larger size), 42 inches long by 24 inches wide, and 2 inches deep. These vessels are fitted with 18 longitudinal divisions, and only open to each other at opposite ends, so that when air is forced in at one end it shall have to travel the whole length of the passages ere it can reach the outlet. This, in the vessel of the size specified, would be about 60 feet. The vessel is filled about one-half inch deep from the bottom with the hydrocarbon oils over the whole length of the passages through which the air has to pass from its entrance to its exit. The air passages are fitted and partially filled with an absorbent material, as hair, cocoa fibre, or a band of cotton as wide as each air passage, which is fixed throughout the whole length to the top or cover of the generator at distances of about 6 inches apart, and is allowed to hang in loose festoons to the bottom of generator, and dip into the oils contained therein. Two at least, or more if desired, of these vessels, filled as above stated, are fitted

to each machine, and are connected together with a pipe and cock from the outlet of one to the inlet of the other, so that air forced into the inlet of first vessel can be made to pass through the whole of the passages in both vessels ere it can be discharged. On top of the generator a small gasholder and tank are fixed, which act as a governor. The outlet-pipe of the second vessel or generator is carried into this gasholder, and an outlet-pipe with a regulating valve connects this holder with the mains or service-pipes leading to the burners. At the outlet of the first vessel or generator there are also fixed a pipe and tap connecting with the gasholder, so that by a simple arrangement of the taps connected to each generator gas can be passed into the holder that has passed only through one or both generators, and thus obtain different qualities of gas. Also from the outlet of the first generator a pipe and tap directly leading to any cooking or heating apparatus are fixed, so that gas can be burned that has only passed through one generator, while at the same time gas may be burned from the holder that has passed through both generators, and has consequently acquired a high illuminating power.

In use the first generator is filled with a spirit of about the same gravity as the ordinary petroleum spirit of commerce. In the top or second generator a much lighter and more volatile spirit obtained by distillation from the ordinary crude spirit of petroleum is placed.

It is preferred to force the air from an aërometer, or it can be forced by a bellows arrangement, or by a fan driven by wheels and pulleys, and a weight. On the top of the gasholder is fixed an arm working a valve, that, as the gasholder rises to its extreme point, gradually shuts off the air from entering the generator, and as it falls opens the valve and admits air as required. Also on the top of generator are two reservoirs, one containing a supply of spirit suitable for supplying the lower generator, and the other a spirit suitable for the second generator, and either by a tap or a fount arrangement connecting these reservoirs with their respective generators spirit is supplied as required.

APPLICATIONS FOR LETTERS PATENT.

1333.—Lillie, J., Manchester, "Improvements in apparatus for regulating, measuring, and registering the flow of liquids." April 13, 1875.

1335.—Morgan-Brown, W., Southampton Buildings, London, "Improvements in the treatment of sewerage with a view of extracting the fertilizing products therein contained, and in the apparatus employed for that purpose." A communication. April 13, 1875.

1367.—Harries, B., Landport, Portsea, "Gauging, and to prevent waste in a continuous supply of water for flushing closets, domestic and general (or other) purposes." April 15, 1875.

1374.—Howard, J., Nunhead Lane, Surrey, "Improvements in apparatus for supplying disinfectants for disinfecting water-closets, and for other purposes." April 15, 1875.

GRANTS OF PROVISIONAL PROTECTION.

1053.—Rawlings, H., Stamford Street, London, "Certain improvements in the construction of filters for the purification of water and other liquids." March 23, 1875.

1063.—Swann, J., Old Jewry, London, "Improvements in gas-burners.' A communication. March 23, 1875.

1161.—Ingram, J., Oakham, Rutland, "Improvements in raising and forcing water and other liquids, and in apparatus for the same." March 31, 1875.

1165.—Hallsworth, S., and Bailes, R., Leeds, "Improvements in purifying illuminating coal gas, and in the preparation of the means employed therefor." March 31, 1875.

1172.—Hogg, J. B., Edinburgh, "An improved gas-torch or fire-lighter." April 1, 1875.

1194.—Bablon, V., Paris, "Improvements in apparatus for regulating the flow of lighting gas as well as for regulating the delivery of liquid and fluid substances of all kinds." April 2, 1875.

1195.—Whitwham, F. G., Cannon Street, London, "Improvements in the treatment of human excreta, and in the manufacture of manure therefrom, and in the apparatus employed therein." A communication. April 2, 1875.

1197.—Stuttle, W., Shrewsbury, "Improvements in gas-brackets." April 2, 1875.

NOTICES TO PROCEED.

4158.—Goodall, R., Leeds, "Improved means or method of clarifying impure water or sewage and preparing the precipitate or sludge for re-use." Dec. 3, 1874.

4290.—Verdier, C., Paris, "An improved water-meter and feeder apparatus for boilers." A communication. Dec. 12, 1874.

1058.—Walker, W. T., Highgate, London, "Improvements in centre-valves." March 23, 1875.

1077.—Challender, J., Manchester, "Improvements in apparatus for illuminating public clocks, which improvements are also applicable to other illuminating purposes." March 24, 1875.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3807.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in apparatus for drawing or raising water or other liquids." A communication. Nov. 4, 1874.

558.—Outerson, J. and A., Connecticut, U.S.A., "An improved filter." Feb. 16, 1875.

681.—Johnson, J. H., Lincoln's Inn Fields, London, "Improvements in the treatment of gases, liquids, and pulverulent substances, and in the machinery or apparatus employed therein." A communication. Feb. 24, 1875.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

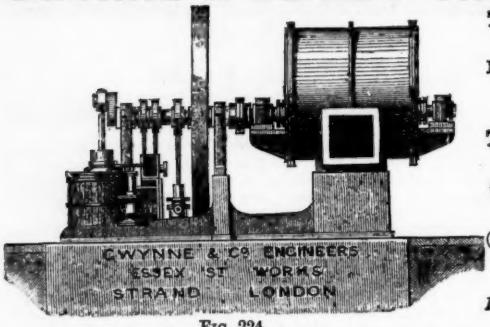


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

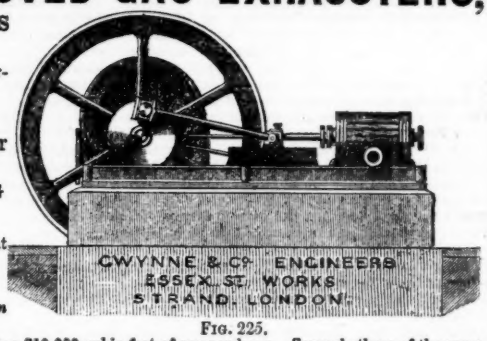


FIG. 225.

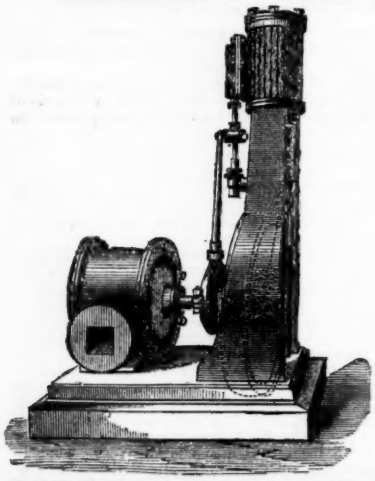
Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO

GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 *cubic feet Patent Gas Exhausters, and many of all sizes.*

BEALE'S IMPROVED PATENT GAS-EXHAUSTER



WITH

ENGINE COMBINED

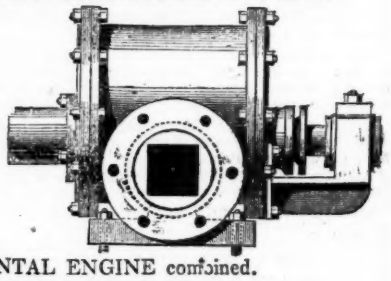
ON

ONE BASE PLATE.

SOLE MAKERS,

GEORGE WALLER & CO.,

Who, since Mr. BEALE'S retirement, are the Oldest Makers.



EXHAUSTERS with HORIZONTAL ENGINE combined.
EXHAUSTERS with OUTSIDE BEARINGS.
MAKERS of ENGINES, BOILERS, and GAS MACHINERY.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.
MANN'S and many other descriptions of WATER DISTRIBUTORS.
SCRUBBERS, PURIFIERS, and CONDENSERS.
EXHAUSTERS from 3000 to 60,000, new and second hand, in stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, S.E., & at STROUD, GLOUCESTERSHIRE.

WANTED, to Lease a good Gas-Work, making at least 20 million feet annually. A fair rate of interest on the capital will be paid as rent.

Address H., care of Messrs. SPENCE AND IRWIN, 67, Grey Street, NEWCASTLE-ON-TYNE.

WANTED, an engagement as Manager, or Manager and Collector, of Gas-Works, where the make is about 20 million. Thoroughly efficient. Highest testimonials and references from present and previous employers.

Address, in first instance, to No. 140, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, good competent and trust-worthy MEN to fix Purifiers, Scrubbers, and General Gas-Work Fittings and Connexions. Constant employment and good wages to deserving men.

Apply to No. 152, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by the Ilfracombe Gas Com-pany, an experienced MAN as Gas-Fitter, Main and Service Layer, &c. To a competent and steady man the situation would be permanent.

State age, wages expected, and send copies only of testimonials, on or before the 25th inst., to Mr. F. RUSSELL, Manager, Gas-Works, ILFRACOMBE.

BOROUGH OF HALIFAX.

WANTED, a practical Engineer and Manager for the Halifax Corporation Gas-Works. The person appointed will be required to devote his whole time to the works. Salary £250 per annum.

Applications, accompanied by testimonials, must be sent to me on or before the 28th inst.

By order,
A. C. FOSTER, Town-Clerk.

Town-Hall, Halifax, April 8, 1875.

FOREMEN.

WANTED, at a large Provincial Gas-Works, two active and intelligent MEN to take charge of the Retort-Houses (night and day alternately). Must be able to manage and control the men, and preference will be given to those who have had experience in a similar capacity. Wages, £2 per week.

Address, in the first instance, to 153, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a few months, by a Pro-vincial Gas Company, a MAN competent to Repair and Test Wet and Dry Gas Meters.

Applications to be addressed to No. 151, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C., stating wages required, present or former employer, &c. None but thoroughly efficient and steady workmen need apply.

IRELAND.—PORTADOWN GASLIGHT COMPANY.

WANTED, by the Directors of this Company, a practical working man as MANAGER of their Works.

Applications, addressed to the SECRETARY, stating salary expected, and enclosing copies of testimonials, will be attended to. House and garden. Fire and light free.

Portadown, Ireland, April 14, 1875.

WANTED, for a Gas-Work in Por-tugal, consuming about 8000 tons of coal annually, climate healthy, a good residence provided, an ENGINEER of experience, who thoroughly understands the management of a Gas-Work in all its branches.

Also a competent FOREMAN, to work under a resident Engineer.

Apply, with references to last employers, naming salary expected, &c., to ADOLPHUS P. HARRISON AND CO., NEWCASTLE-ON-TYNE.

WANTED, to go abroad, a steady and efficient young man, as GAS-FITTER. Must be a good lead and iron pipe hand, able to lay services, fix and repair meters, &c.

For further particulars, apply to Messrs. HUTCHINSON BROTHERS, Gas Engineers, Albert Works, BARNSLEY, stating age, married or single, wages required, reference, &c.

AMMONIACAL LIQUOR.
TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the Swansea Gaslight Company are prepared to receive TENDERS from parties willing to contract for a period of from One to Three years for the purchase and removal of the whole of the AMMONIACAL LIQUOR as produced at the Gas-Works, Swansea.

The annual production exceeds 300,000 gallons.

The delivery can take place into the contractor's tanks (on rail) in the works, or pumped direct into boat-tanks in the South Docks, Swansea.

Tenders to be sent in to me, the undersigned, on or before Thursday, the 6th day of May prox., and to specify the price at per degree Twaddel per 100 gallons of liquor.

THORNTON ANDREWS, Manager.

Swansea, April 19, 1875.

THE ANALYSIS OF COAL GAS.—Mr. A. L. Sparkes, B.A., F.C.S. (Gas Examiner at Hanley, Stoke-Fenton, and Newcastle), gives Private Lessons in Photometry and Gas Testing.

Terms on application at Snow Hill Cottage, Shelton, STOKE-ON-TRENT.

NEW EDITION, NOW READY,

ADVANTAGES OF GAS FOR

COOKING AND HEATING.

By MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their Gas Consumers.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (fcap. 8vo., morocco gilt)
OF

THE GAS MANAGER'S HANDBOOK.

By THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

FOR SALE, an 8-in. Governor and Con-nexions, in good working order.

Apply to S. CROSS, Manager, Gas-Works, Abergavenny, MONMOUTHSHIRE.

BRENTFORD GAS COMPANY.

FOR SALE—A 30,000 per hour Station-METER, by Sugg, of Westminster, in good condition and working order.

Apply to FRANK MORRIS, Engineer to the Company, BRENTFORD.

FOR SALE, several lengths of 10-in. Hydraulic Main; Condenser, part 6-in. and part 4-in.; four Purifiers, 6 ft. by 5 ft. by 3 ft. 6 in.; Station Meter to pass 4500 per hour; one dozen 15-in. Circular Mouthpieces, 4-in. outlet.

Apply to FREDERIC CHUBB, Gaslight Company, Ironbridge, SALOP.

ON SALE (on account of replacement by larger), one set of four 10-ft. PURIFIERS, with lifting gear, dry centre-valve, 10-inch connexions. The whole of the apparatus is Thorncliffe manufacture, and in capital condition.

Apply to Mr. LONGWORTH, Dukinfield, MANCHESTER.

TO GAS-FITTERS, COPPERSMITHS, AND TIN AND IRON WORKERS.

FOR DISPOSAL, an old established (over 60 years) BUSINESS, at Leicester, in one of the leading thoroughfares, suitable for an Ironmonger. A successful trade has been carried on for many years by the present proprietor, who is retiring. Large retail shop, warehouse, workshop, and dwelling-house, with every convenience, also large garden adjoining. Stock, fixtures, goodwill, &c., at a valuation.

Apply, by letter, to Y. Z., 25, St. Nicholas Street, LEICESTER.

TO IRON PIPE FOUNDERS.

THE Bristol Water-Works Company require TENDERS for about 2700 tons of Cast-Iron Pipes, 21 inches in diameter, specifications of which, with forms of tender, may be obtained by application to JOHN TAYLOR, Esq., 27, Great George Street, WESTMINSTER, S.W., the Company's Engineer.

Specifications will only be forwarded to Founders direct, and not to agents.

THE Directors of the Alton Gas and Coke Company are prepared to receive TENDERS, with plan and specification, from *bonâ fide* gasholder makers, for the erection of a TELESCOPIC GASHOLDER, 36 feet in diameter.

Tenders not accepted will be returned free by post.

The Directors do not pledge themselves to accept the lowest or any tender.

Further information may be obtained from the MANAGER at the works, ALTON, HANTS.

April 16, 1875.

BOROUGH OF ROCHDALE.

TO CONTRACTORS.

THE Gas Committee invite Tenders for the necessary excavation and the construction of a GASHOLDER-TANK.

Plans and specifications may be seen, and full particulars obtained, on application to the Engineer, Samuel Hunter, Assoc. Inst. C. E., Gas-Works, Rochdale.

Tenders, marked "Tender for Tank," must be sent to my Office on or before the 27th of April inst.

By order,
ZACH. MELLOR, Town-Clerk.

Town-Hall, Rochdale, April 15, 1875.

TO CONTRACTORS.

THE Directors of the Oaken Gates and St. George's Gas and Water Company, Limited, are prepared to receive TENDERS for the construction of a GASHOLDER-TANK, 51 feet 6 inches in diameter, at their Gas-Works at Oaken Gates.

Drawings and specification may be inspected at the Offices of Messrs. Knowles and Michelmore, Wellington, Salop, between the hours of 10 and 4 o'clock; and Tenders must be delivered to me on or before the 6th of May next.

The Directors do not pledge themselves to accept the lowest or any tender.

ISAAC KNOWLES, Secretary.

Wellington, Salop, April 17, 1875.

THE Wallingford Gas Company are prepared to receive TENDERS for the erection of a Gasholder, Retort-House, Roof, Purifiers, Condensers, Meter, and Governor, and laying a quantity of 6-in. and 5-in. Main, at their proposed new works at Wallingford.

The plans and specification may be seen, and particulars obtained, on application to Mr. CARTHEW, Secretary to the Company, at WALLINGFORD, or at the Office of Mr. ALFRED PENNY, C.E., No. 20, Abingdon Street, WESTMINSTER.

Tenders to be sent in, addressed to the Secretary, not later than Monday, May 3.

The Directors do not bind themselves to accept the lowest or any tender.

BOURNEMOUTH Gas and Water Com-pany have the following articles FOR SALE, and are ready to receive Tenders for the same:—

One GASHOLDER, now in use and in good condition, 36 ft. diameter by 14 ft. deep, with columns and girders complete.

Four PURIFIERS complete, with wrought-iron covers, each 8 ft. by 8 ft. by 3 ft. 6 in.; hydraulic centre-valve, connexions, and lifting gear.

The Furnace Fittings, Hydraulic Main, Retort Mouthpieces, Ascension and Dip Pipes, in connexion with Seven Beds of Retorts, containing 43 Retorts.

One 7-in. Governor; Three 7-in. Valves; Eleven 5-in. Valves; Clay Retorts, new—5 circular, 9 oval; 59 Saddle Lumps for Retort Settings.

The Gasholder is required to be removed at once.

The Purifiers being in use cannot be removed before the beginning of August next, nor the Retort Fittings, &c.

The above may be seen on application at the Works at Bournemouth.

Tenders to be sent to the Secretary, WILLIAM CASH, Esq., 26, Nicholas Lane, LONDON, E.C.

THE MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

NOTICE is hereby given that an EXTRAORDINARY GENERAL MEETING of the SHAREHOLDERS of this Company will be held in the Board Room at the Gas-Works, Mitcham, in the County of Surrey, on MONDAY, the 3rd day of May, 1875, at Seven o'clock in the evening precisely, to sanction the issue of 3934 new shares in the original capital of the Company, the terms upon which the same are to be issued, the erection of additional works on the Company's land at Mitcham, and the removal, disposition of, or alterations in the Company's works and land at Wimbledon.

Dated the 6th day of April, 1875.

By order of the Board.
BENJAMIN GREEN, Secretary and Manager.

Mitcham, Surrey.

WOLSTON'S TORBAY IRON PAINTS.

THE Torbay and Dart Paint Company, Limited, 23, Great George Street, Westminster, S.W., having been informed that PAINTS not manufactured by them are being offered to Gas Companies and the public as "WOLSTON'S," hereby give notice that they will TAKE PROCEEDINGS against any persons infringing their rights as sole proprietors and manufacturers of Wolston's Torbay Iron Paints.

(See Advertisement on another page.)

PONTYPOOL GAS AND WATER COMPANY.

TO CONTRACTORS.

THE Directors hereby invite Tenders from competent persons for the construction of Three FILTER-BEDS, according to drawings and specification, which may be seen at the Office of the Company, in Pontypool.

Copies of specification, with form of tender, may be had from the Secretary of the Company, on payment of 5s. for each copy.

The Secretary of the Company will arrange to show tenderers the sites of the proposed works.

Tenders, sealed and endorsed "Tender for Filter Beds," to be delivered at the Office of the Company, on or before the 6th day of May, 1875.

The lowest or any other tender will not necessarily be accepted.

By order,
ANDREW HAIR, Secretary to the Company.

Pontypool, April 8, 1875.

COALS.

THE Richmond (Surrey) Gas Company wish to receive TENDERS for about 6000 tons of COALS, viz:—

3000 tons of best Inland.

3000 tons of Newcastle, either New Pelton, Ravensworth Pelaw, Pelaw Main, Waldridge, or Holmside.

To be delivered into the Company's works (as directed by the Manager) free of all expense, to be weighed by their weighing machine, and paid for accordingly,

Cash monthly.

The Company have a railway siding about 200 yards from their works.

If coals are sent by barge, the nearest point is Mortlake, about one mile from the works.

Quantities Required.

In May	300 tons.
June	500 ,,
July	600 ,,
August	600 ,,
September	700 ,,
October	1000 ,,
November	1100 ,,
December	1200 ,,
	6000 tons.

Further particulars may be obtained on application to Mr. Eldridge, the Manager.

Sealed tenders to be addressed to the Chairman of the Company, Gas-Works, Richmond, Surrey, marked "Tender for Coals," on or before the 29th of April, 1875.

The Directors do not bind themselves to accept the lowest or any tender.—By order,

E. B. BLOTT, Secretary.

CORPORATION OF NOTTINGHAM.—GAS DEPARTMENT.

TENDERS FOR COALS.

THE Gas Committee are desirous to receive OFFERS for supplies (amounting in the aggregate to 80,000 tons) of SOFT COALS and SOFT COBBLES or NUTS, for the period terminating on the 30th of April, 1876.

The Large Coals and the Cobbles or Nuts are to be separately delivered, where and as from time to time directed, by and at the expense of the Contractors, upon the Gas-Works Railway Siding, in the East Croft, at Nottingham, and at the Midland Company's Railway Station, at Nottingham, and also on the Gas-Works Railway Sidings, at Radford and Basford respectively; and at and after the rate of one-eighth part of such total quantity in each calendar month, commencing with the month of July next, till the Corporation shall be satisfied with the amount of accumulated stock, and afterwards at such rate as shall be from time to time directed, till the agreed quantity shall have been delivered.

The Corporation will undertake to receive from each person or firm whose tender may be accepted, a total quantity of 5000 tons at the least; but they do not bind themselves to accept the lowest or other tender or tenders, till after a satisfactory trial of the Coals and Cobbles or Nuts, to which such tender or tenders may relate, shall have been made. They are to be the best of their kind, well screened, and as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed (20 cwt. to the ton), upon the Corporation machines, or upon such other machines as may be mutually agreed upon.

Payments will be made monthly, if and so long as the contract shall be duly fulfilled, to the extent of nine-tenths of the amount of the verified invoices, and the balance will be discharged on the satisfactory completion of the contract.

Sealed tenders (to be made on forms obtainable at the Gas Offices), specifying the description of Coals and the pits at which they are to be raised, and stating the prices for deliveries at the several places and in manner and subject to the conditions aforesaid, must be delivered to Samuel George Johnson, Esq., Town-Clerk, on or before Thursday, the 13th day of May next.—By order,

M. OGLE TARBOTTON, Engineer.

Corporation Gas Offices, George Street,
Nottingham, April 9, 1875.

THE Belper Gas and Coke Company are prepared to receive TENDERS for the supply and fixing of the following APPARATUS:—

A new Bench of 29 Retorts, with wrought-iron Hydraulic Main, Ascension-Pipes, &c. Condensers, Scrubber, Engine and Exhauster, and Boiler. Also for the erection of an Engine-House.

Drawings and specifications may be seen at the Gas Office, New Road, Belper, on application to the undersigned.

Sealed tenders to be sent in to me on or before April 27.

The Directors do not bind themselves to accept the lowest or any tender. By order,

S. SOWOOD, Manager.

The Company will have for DISPOSAL 13 Mouthpieces, 15 in. by 13 in.; 3 Round ones, 15 in.; 32 ft. of Hydraulic Main; Ascension-Pipes, &c., for which offers are invited.

THOMAS ALLAN & SONS, of Spring-bank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, 1½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present a large stock, which they are open to sell at moderate prices.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

GARSIDE'S IMPROVED REGIS-TERED TUBE-VICE, holds all sizes of Wrought-Iron and Brass Tubes, from a 2-in. socket to the smallest brass tube made.

GARSIDES IMPROVED MAIN DRILLING CLIP, made in two sizes, to drill from 2-in. to 6-in. Mains, and from 6-in. to 12-in. Mains.

The above tools are made light and handy.

For drawings, &c., apply to the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

PATENT FUEL AND LIME FOR PURIFYING FROM FOUL LIME.

By a simple process the Foul Lime is converted into Fuel, by the combustion of which the lime is reproduced as a purifying agent.

Licences to work the invention will be granted to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

The adoption of the above invention, without a licence from the Patentee, will be an infringement of the patent, and will subject the person or company guilty of such infringement to legal process.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD
CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention. CHARLES HORSLEY, Agent.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
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BELFAST.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS, &c., &c.
SCOTSWOOD FIRE-BRICK WORKS,
NEAR
BLAYDON-ON-TYNE.

CAFFALL, THOMAS, & CO.,
LIMITED,
Are prepared to supply and erect their
PATENT MOVEABLE SEALS
FOR DIP-PIPES,
Or to grant Licences for the Manufacture and Use of the same.
Particulars may be obtained on application at the Offices,
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"SELLARS' CEMENT"
PREVENTS WASTE OF GAS FROM RETORTS;
SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;
GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;
And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.
J. C. SELLARS,
THE GAS CEMENT WORKS,
BIRKENHEAD.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,
Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.
To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.
To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

WM. RICHARDS,
INVENTOR OF THE DRY GAS-METER,
REVISER OF "HUGHES ON GAS-WORKS,"
CONSULTING GAS ENGINEER,
Advises on all matters of business connected with Gas Lighting. Furnishes Working Drawings of Retort-Settings, Specification of Works, complete or in detail.
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TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

Mr. NORWOOD EARLE,
GAS SURVEYOR,
12, QUEEN VICTORIA STREET, E.C.,
Advises on all matters connected with the Distribution of Gas, Public Lighting, Gas Testing, &c.
Valuations made for Assessment and other Purposes.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBU-TION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.
South Shields. W. J. WARNER.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

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GAS, STEAM, AND WATER FITTINGS.

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MANUFACTURER OF EVERY DESCRIPTION OF
Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts.
A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in.,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
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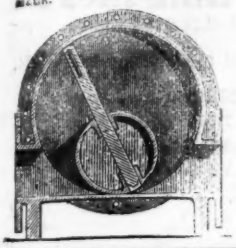
J. BEALE'S PATENT GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING

GAS EXHAUSTERS

ARE NOW MANUFACTURED BY

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MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.

B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.

Estimates and Prices on application to

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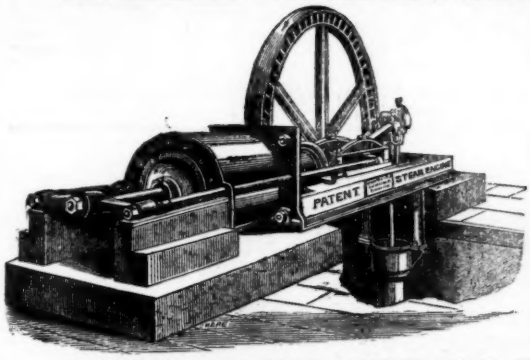
B. DONKIN & CO.,

PATENT HORIZONTAL COMPOUND CONDENSING

STEAM-ENGINES,

APPLICABLE FOR DRIVING GAS-EXHAUSTERS.



These Engines have been at work a sufficient number of years to prove their durability and efficiency.

One of them has been subjected to a scientific and exhaustive trial to test the consumption of fuel, with the result that an expenditure of less than 2 lbs. of coal per hour developed one indicated horse power.

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The only purifying material which removes by one process, without injury to the purifiers, all Ammonia and Sulphuretted Hydrogen. It has been in use for upwards of five years at some of the largest Gas-Works in the Kingdom.

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SMALL COST—COMPACTNESS—PERFECTLY SELF-ACTING—SELF-REGULATING—SELF-CLEANSING—SMALLEST BOILER PRESSURE SUFFICIENT—NO STEAM-ENGINE—NO GEARING—NO ATTENTION—NO EXTRA ROOM REQUIRED—NO TEAR AND WEAR—NO NOISE—NO OSCILLATION IN VACUUM, OR BACK PRESSURE.

UPWARDS of 100 in USE in CONTINENTAL GAS-WORKS.

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These Gas-Exhausters are kept in stock in 16 different sizes, delivering from 500 cubic feet to 60,000 cubic feet of Gas per Hour, at

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Every description of Worm and Wheel Cutting.

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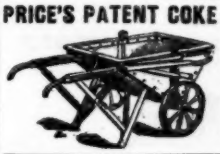

effecting a great saving of time, labour, and expense.

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MANUFACTURE EVERY DESCRIPTION OF

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WROUGHT-IRON TUBES & FITTINGS.

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CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

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BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

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Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

CELEBRATED HALBEATH STEAM COALS,

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Bends, Tees, and Irregulars,

AND

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(ESTABLISHED 1851.)

TRADE MARK

These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Waggon Works, and the Paint Trade generally. They are the BEST PROTECTORS of IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to ironwork. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only before use to be thinned down in the ordinary way—are kept in stock:—

Torbay Brown.	Torbay Red.
Dart Green.	Slate.
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Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
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Navy Green.	Lead.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
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All other Colours made to order.

PRICES and TESTIMONIALS on APPLICATION.
(See Notice on another page.)

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WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
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Successors to
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GAS AND WATER PIPES.
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CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B. ON CLYDE.
Prices on application.

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A LARGE STOCK ALWAYS IN HAND OF
IRON, BRASS, COMPOSITE, AND LEAD TUBES, FOR GAS AND WATER,
AND EVERY DESCRIPTION OF
GAS AND WATER FITTINGS.
THE PATENT DRY AND WET METER, WITH THE LATEST IMPROVEMENTS.
STREET LAMPS AND COLUMNS IN GREAT VARIETY.
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GAS MOONS,
Cut and Engraved, of the newest designs
GAS REFLECTORS
In Silver and Glass
GAS NIBS
AND
BURNERS
Of every description.

Pattern-Books of Gas-Fittings, Crystal and Ormolu Chandeliers for 1873, are now complete.

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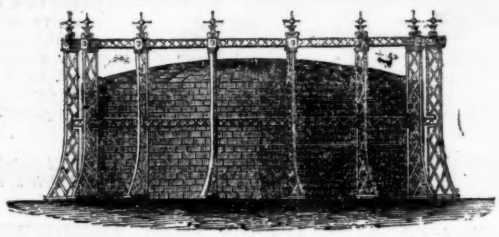

THE HORSELEY COMPANY,
LIMITED,
TIPTON, STAFFORDSHIRE.
LONDON OFFICE:
6, WESTMINSTER CHAMBERS, VICTORIA STREET,
GAS ENGINEERS, IRONFOUNDERS, &c.,
MANUFACTURERS OF
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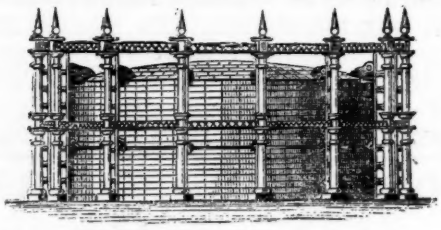
AND ALL REQUISITES FOR EITHER
GAS OR WATER WORKS;
ALSO
MAKERS OF ROOFS, BRIDGES, &c.

HOPE IRON WORKS,



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GAS ENGINEERS & CONTRACTORS,
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GAS APPARATUS OF EVERY DESCRIPTION,
Including Improved
Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,
And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

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GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

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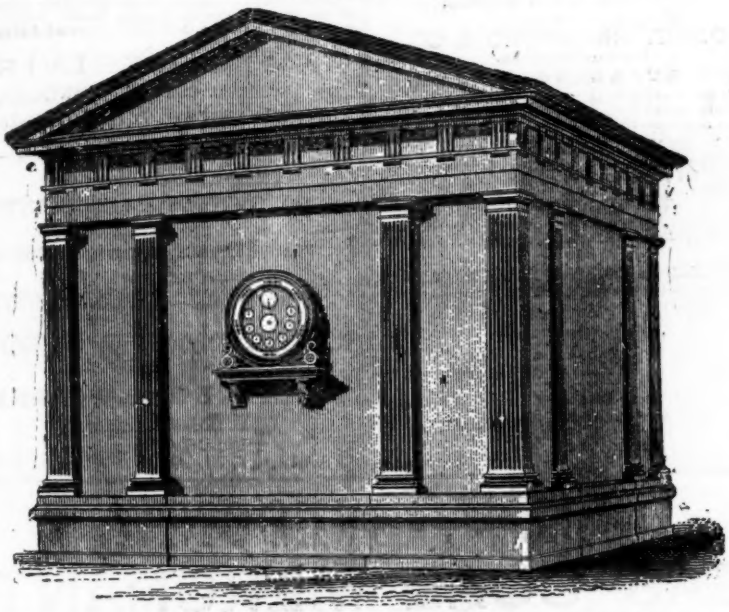
OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



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WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

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Mr. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

N.B.—The second edition of this Work, *now ready*, contains Illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

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SUPPLY THE BEST

REAL OLD SILKSTONE

GAS COAL & GAS NUTS.

CONTRACTS ENTERED INTO.

C. T. GRANT & CO. COAL BROKERS GLASGOW.

Scotch Churls

PRESENT PRICE:

5s. 6d. per Ton at Pit.

8s. 9d. ,, F.O.B.

Cubic Feet.	Illuminating Power.	Coke (sup. qual.).
10,000 ..	20 candles. ..	12 cwt.

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CHESTER-LE-STREET,

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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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MOBBERLEY & PERRY,

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FIRE CLAY and BRICK WORKS,

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Proprietors of

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Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, & TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

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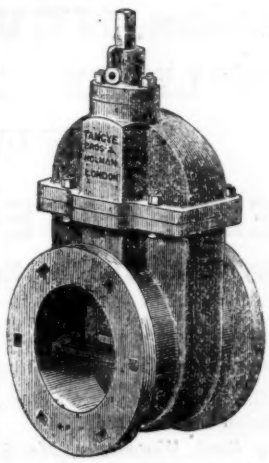

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Which yields 13,265 cubic feet of 35·86 standard candle gas; and 973 pounds of good coke, containing 18·89 per cent. of ash.
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Which yields 10,575 cubic feet of 27·33 standard candle gas; and 1240 pounds of coke, containing 11·56 per cent. of ash; and
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This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.
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The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.
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STOURBRIDGE.
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THE BEST HAND-PICKED ROUND CANNEL,
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THORNCLIFFE IRON-WORKS AND COLLIERIES,
NEAR SHEFFIELD,
STRONGLY RECOMMEND A TRIAL OF THEIR
CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·9	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.
Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

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Has on hand a quantity ready for immediate delivery. Can strongly recommend both qualities.

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ALBERT GAS COAL.

THE DERBYSHIRE
SILKSTONE COAL COMPANY,
LIMITED,
CAN OFFER A
GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	**10,775**
Weight of coke in lbs. per ton of coal	**1,465**

ANALYSIS AND PRICES ON APPLICATION TO
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This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

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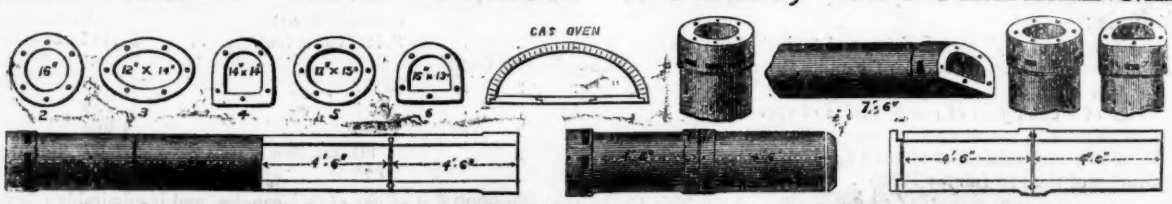

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